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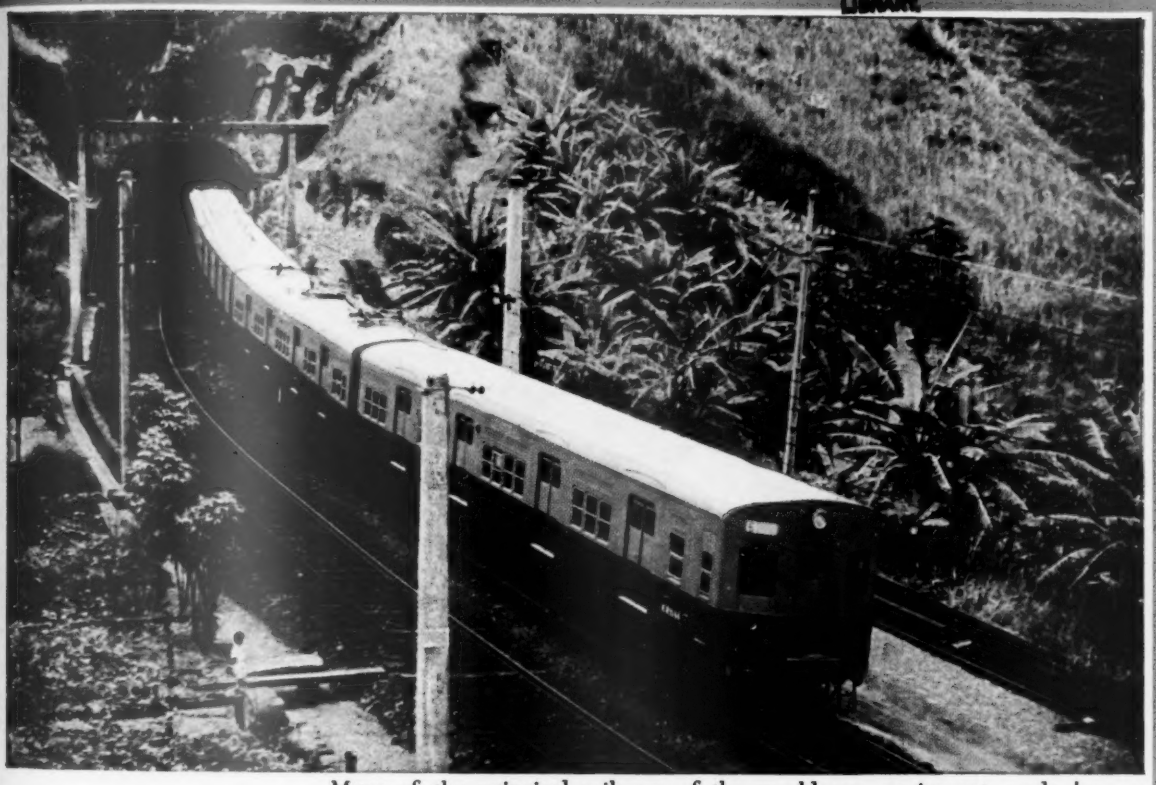

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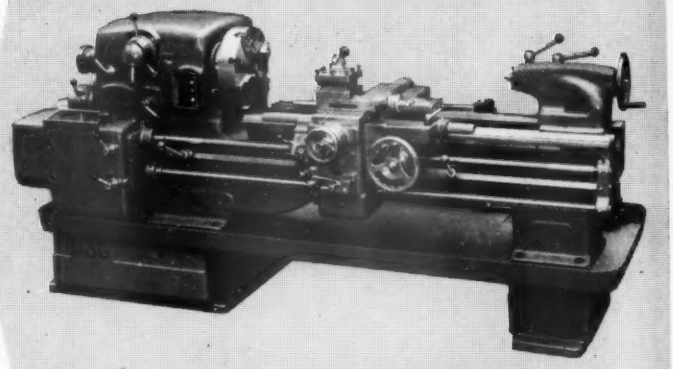

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Needs of New Railways

THE purposes for which railways are now being built all over the world vary greatly. Because no mode of transport can compare with a railway in economical movement over land of minerals, several lines are now under construction or planned in connection with mining or steel manufacture. Examples are the new railway in French Equatorial Africa and, of those mentioned recently in this journal, new lines in Guinea, Bengal and Bihar, Queensland, and Northern Canada. In Great Britain work has now begun on a new branch of British Railways, Eastern Region, to a newly opened colliery in Nottinghamshire, but all mineral lines in the close railway network of this country are necessarily short. Railways for general purposes, including development of the territory and carriage of general merchandise, livestock, and agricultural produce are being built or have been completed recently in environments as diverse as Spain, the U.S.S.R., Israel, the Sudan, Nigeria, South Africa, India, China, and Brazil. Cut-off lines to reduce mileage and accelerate transits are planned or under construction in East Africa and India. The projected west-to-east railway from Nigeria to the Sudan will include pilgrims to Mecca in its traffics. There is much activity in building or extending underground railways in large cities, notably Toronto and Lisbon. The foregoing are only examples. The demands for material and equipment of all kinds over the next few years are bound to be immense. Constructional costs everywhere are high, and plant will be needed to secure efficient operation and avoid wastage of costly assets. For example, mineral lines need high-capacity wagons for ore and similar commodities. The manufacture of these requires skills and techniques which, despite the efforts of some countries to achieve self-sufficiency in rolling stock, are still confined largely to builders in highly industrialised countries who specialise in exports of such equipment. Keen interest will be taken in brakes, couplings, and roller bearings, and, in tropical countries, air conditioning. To obtain maximum capacity of lines with long single-track sections, some managements may decide on C.T.C. from the outset. Demands for signalling equipment, including recently developed apparatus, will be great. Even where labour is relatively cheap, mechanical equipment will be sought for track laying and maintenance, as will the devices for lengthening the life of the track and increasing smooth running. The demand will be great, but so will be the competition to supply the wide variety of equipment required. Success will come to those suppliers who see what is wanted, and where, and are first in the field to offer it.

New Line in French Equatorial Africa

THE £9,500,000 contract awarded jointly to Taylor Woodrow (Overseas) Limited; the Compagnie Industrielle de Travaux, France; and the Utah Construction Company, U.S.A., for building a 200-mile railway in French Equatorial Africa is one of the largest placed for new construction in recent years. The order is for a single-track metre-gauge line and has been placed by the Compagnie Miniere de L'Ogooue, which is developing extensive manganese deposits in the Moanda area some 30 miles from Franceville. The ore itself is particularly rich, with a manganese content of some 40 per cent. The railway will run from Mayoko to a point near Brazzaville on the Belgian Congo border, where it will connect with the Congo-Ocean Railway to provide a direct run to the port of Pointe Noire. It will traverse mainly jungle and other difficult terrain and the work will involve the removal of some 12,250,000 cu. yd. of earth, construction of two major bridges, many viaducts and culverts, and the setting up of quarries to obtain stone direct. The line is expected to be completed by 1962.

Re-equipping the Central Line, L.T.E.

BY placing orders to the value of some £3,500,000 for the traction motors and other mechanical and electrical equipment for the Central Line renewal programme in advance of the main order for car bodies, the London Transport Executive has enabled manufacturers engaged on other orders for the Underground to plan production and give the L.T.E. the benefit of lower prices. After trials of the 12 prototype motor cars ordered recently from Cravens Limited, it is intended to order 330 new cars for the Central Line. These will be motor cars constituting half the vehicles of a normal train. They will be used to form eight-car trains with an equal number of trailers obtained by rebuilding other stock, much of it from the Piccadilly Line. The rebuilt cars will be similar in comfort to the new vehicles and painted silver. Their use will enable the re-equipment of the Central Line to be carried through more quickly and economically. As new Piccadilly Line trains are delivered, some of its present stock will be transferred to lengthen Central Line trains from seven to eight cars before the new and rebuilt vehicles are delivered.

B.T.C. Orders for British Railways

ORDERS for more equipment for British Railways to a total value of some £1,250,000 have been placed by the British Transport Commission. They include motor-

car transporter wagons, power and ancillary equipment, experimental plastic containers, and freight and passenger rolling stock. The two-tier motorcar transporter wagons can carry six medium-size vehicles, four on the upper deck and two on the lower deck. A description was published in our March 14, 1958, issue. They will be fitted with continuous brakes for fast running and allocated to the Western Region. Of the 99 sets of equipment for the multiple-unit diesel trains to be built in British Railways workshops, 53 will be twin-engine and transmission units for power cars, and the remaining 46 for unpowered trailer vehicles. The London Midland Region is to be allocated 78 of the vehicles, including 18 for two-car units with twin 150-h.p. engines. The remaining 60 will form four-car multiple-unit trains consisting of two trailers and two power cars, each with twin 230-h.p. diesel engines. Resin-bonded glass fibre will be used for the sides, ends, floors, and roofs of six experimental containers, which will have mild-steel bases and fittings to enable them to be lifted by cranes.

English Electric Diesel Locomotives for the Sudan

THE order valued at about £1,500,000 received by the English Electric Co. Ltd. from the Sudan Railways for 15 1,875-h.p. Co-Co main-line diesel-electric locomotives was won in competition with more than 20 other companies. The Vulcan Foundry Limited, a member of the English Electric group, will be responsible for the mechanical parts and for erection. The locomotives will work in general service on the Sudan Railways 3-ft. 6-in. gauge lines, including haulage of the cotton crop between the interior and Port Sudan. Scarcity of locomotive water in several places and the difficulty of importing coal are understood to have contributed to the decision to turn over to diesel traction. Diesel shunting locomotives have already been supplied by English Electric to the Sudan Railways and proved highly successful in service.

Overseas Railway Traffics

CANADIAN Pacific Railway Revenue for the month of December, 1958, amounted to $40,062,707, compared with $39,511,841 in December, 1957. Railway expenses were $35,116,981 ($35,726,085), resulting in net earnings of $4,945,726 ($3,785,756). Aggregate net earnings from January 1 to the end of December were $36,491,847, compared with $38,246,382 in 1957, a decrease of $1,754,535. East African Railways & Harbours approximate railway revenue for December, 1958, was £1,722,000, compared with £1,638,000 in December, 1957, an increase of some £84,000 and the second highest monthly revenue figure recorded in 1958. The total railway revenue for the year was some £18,915,000, compared with £17,743,000 in 1957, an increase of £1,172,000. During the year receipts increased, compared with 1957 in all services except other coaching and miscellaneous traffic. Net railway earnings of the West of India Portuguese Guaranteed Railway Co. Ltd. continued to decline in comparison with the previous year's equivalents during December, 1958, and the first half of January. In the main this is attributable to poor goods receipts. At January 20, aggregate goods receipts from the commencement of the financial year showed a decrease of Rs. 1,147,006, compared with the same period of 1957-58.

Costing of Transport Operations

THE most helpful of many explanations in the paper on transport costs read in Dublin last week by Mr. H. E. Osborn, Chief Accountant & Financial Adviser, British Transport Commission, to the Irish Section of the Institute of Transport, is that relating to traffic costing. The method of costing a railway freight operation is outlined with clarity, and with indications of the difficulty in allocating accurately the costs of track and signalling. His remarks on meeting joint costs deserve careful study. As to costing of passenger train operations, he points out that useful figures often can be given only for fairly self-contained services or related groups of services. The "cost per passenger" for a particular journey is an abstraction with little or no validity. Mr. Osborn observes that with the help of traffic costing, a reasonably clear picture of the distribution and structure of the costs of the undertaking can be built up, though as a background to negotiations and decisions on charging, costing figures and information must be regarded "not as facts but as valuable comments on the probable behaviour of costs, under varying conditions and in relation to the traffics concerned," and that advice on the likely level of the competitor's costs may often be helpful.

Passenger Traffic Recovery in the U.S.A.

DESPITE prophecies of the eventual extinction of the passenger business of the U.S.A. railways, an improvement in traffic is reported. Steps taken to gain traffic include admission by certain railways of passengers holding "coach," or second class, tickets to Pullman sleeping cars on payment of the normal sleeping car supplement. On some railways, such as the Great Northern and Northern Pacific, this privilege does not apply to their fastest transcontinental trains but to slower trains which, nevertheless, are composed of recently-built streamline stock. The Burlington and Baltimore & Ohio Railroads have introduced "slumbercoaches," of the duplex-roomette type, affording single room accommodation at coach fares with a very moderate supplement. Much the same facilities are offered in the Missouri Pacific "Thrift-T" and the Milwaukee "Touralux" sleepers. These facilities have added substantially to passenger bookings, and the increase has been recovered largely from road transport. Low-cost meals also are attracting passengers. It remains to be seen whether this recovery is maintained in the face of growing competition from the private motorcar over medium distances.

London-Glasgow Overnight Container Service

THE overnight door-to-door container service, known as the Condor, to be introduced on March 16 between London and Glasgow by the London Midland and the Scottish Regions of British Railways, is the first step of this kind to capture traffic. The main features are the speed and inclusive service. The trains between Hendon and Gushetfaulds, by the main line of the former Midland Railway to Carlisle, will be hauled by two Metrovick Type "2" Bo-Co diesel-electric locomotives. The rail journey time will be about 10 hr. for the 400 miles. Trains will weigh 550 tons and be fully braked and equipped with roller-bearing axleboxes. Each of the 27 wagons will convey one large and one small container. The flat rates which include collection in the afternoon and delivery next morning within a specified radius, are respectively £16 and £18 for containers of 300 and 700 cu. ft. capacity, irrespective of the commodity. The maximum load for a container is 4 tons. Collection and delivery beyond the free area can be arranged at additional charges. It will be advantageous in time and cost to traders to consign by Condor from and to places some distance north of London, such as St. Albans, which latter place is passed by the container trains.

Attracting Traffic to South Wales Ports

THE introduction of special rates for merchandise through South Wales ports is an act of statesmanship on the part of Sir Brian Robertson, Chairman of the British Transport Commission, and of the officers concerned of British Railways, Western Region, and of British Transport Docks, who negotiated with the Industrial Association of Wales & Monmouthshire. From the details given elsewhere in this issue it will be seen that the rates are designed mainly to attract long-haul traffic in consignments of over 2 tons. Success in this object will benefit British Railways, British Transport Docks, and the communities which rely on the prosperity of the South Wales ports for their living. As with the rates introduced recently for traffic via Merseyside, the new

rates include rail conveyance within the docks and, with certain traffics, loading and unloading of wagons. Short-haul traffic consigned to or originating in South Wales is excluded from the new arrangement except for imports or exports via Port Talbot and Swansea Docks, for which rates can be quoted on demand. Much preliminary work still must be done in working out and applying these charges.

Encouraging First Class Travel on Saturdays

BECAUSE much travel over longer distances on British Railways is on business, a good many first class seats in expresses tend to be unoccupied on Saturdays. The considerable effort of altering the composition of train sets for the one day would not be worth while. To encourage first class travel on Saturdays, the Regions concerned are issuing tickets at reduced fares between London and Edinburgh, Glasgow, Liverpool, and Manchester, available for return the same day or on the following Saturday. The rate of 2¼d. a mile for the additional comfort provided must be one of the lowest in the world. This, and the speed and safety of the train should attract many who might otherwise go by road, more particularly during the winter months. Besides this facility, which is limited to Saturdays, there are the extensive possibilities of first class travel provided by mid-week return tickets. First class accommodation in some long-distance trains, but not in the Anglo-Scottish day expresses, is reported to be well filled regularly on working days. The new regulations should go far to ensure good payloads throughout the week.

Three-Position Semaphores in India

THE three-position semaphore once attracted much attention in Great Britain and became used there to a small extent, until ruled out by the decision taken some 35 years ago to use colour-light signals exclusively in future for multiple-aspect work. It gained new favour on some railways overseas, to which the success achieved in Belgium in operating it by double-wire transmissions appealed. The three-position arm offered means of simplifying the existing indications, especially at single-line loop stations, and eliminated some anomalies associated with older types of signal. In India before the war of 1939-45 the then South Indian, Assam-Bengal and Burma Railways adopted three-position semaphores, both of home and distant type, with some small variations in the method of applying them, and got very good results in service. The Central Railway of India now has followed suit. It has retained the bracket type signal where routes diverge, as this gives a readily understood system of aspects well adapted to high speed through running, for which the vertical arm provides an unmistakeable and very plain indication. East African Railways & Harbours also has adopted this form of semaphore, as described in our November 29, 1957, issue.

Southern Region Electric Locomotive

EXPERIENCE with the earlier Co-Co type electric locomotives on the Central Section of the Southern Region of British Railways has indicated that somewhat more powerful units would be necessary for the Kent Coast electrified service, starting in June, if the close headways possible with multiple-unit stock were to be maintained. It was considered that a locomotive of about 2,500 h.p. was required of the mixed traffic type, but capable of a high maximum speed. The advances made in electrical equipment over the last 15 years have made possible a locomotive of the required power with only four axles and a weight of under 80 tons. It is described elsewhere in this issue. The initial order of 13 locomotives will be required to handle freight trains of up to 900 tons over the heavily graded routes of the South Eastern Division. They will also operate, to express schedules, fully fitted trains of 30 or more Continental train ferry vehicles and passenger trains, including the "Night Ferry," which may load up to as much as 700 tons.

Transport in the Lords

WHEN the Transport (Borrowing Powers) Bill was debated on Second Reading in the House of Lords last week, speakers for the most part eschewed a political approach. As a consequence there was a more realistic and constructive discussion of British Transport Commission affairs than had been the case in the Commons. This more helpful tone was set by Lord Gosford who, in presenting the Bill for the Government, was entirely factual. Lord Silkin, leading for the opposition, posed the fundamental question whether the British Railways could ever pay their way. On this the remainder of the debate largely turned.

Whereas Lord Gosford repeated the Commission's confidence that the railways could still break even by 1962, only one subsequent speaker, Lord Stonehaven, shared this view. Whether the Commission's optimism or the more gloomy view generally held as to the future of the railways is correct, only time can show. A clearer indication should be given when the review of the modernisation plan undertaken by the Commission at the Minister's instigation is completed. As to this Lord Gosford was able to give more information as to its scope than was previously available. Its terms of reference, he stated, were three fold. First, to assess results achieved from modernisation by the end of 1958; second, a re-examination of the future course of the plan, with particular reference to the next five years; and third, re-appraisal of the economics of modernisation and the steps necessary to achieve the break-even target by the earliest possible date. He stated that consultations as to future levels of traffics and customers' needs were taking place with such bodies as the National Coal Board, the Iron & Steel Board, and trade associations. The results of the inquiry are to be placed before Parliament in the Spring. Meanwhile modernisation is proceeding at an accelerated pace. The authorised capital investment for the current year is the record figure of £178 million.

No voice was raised in the House of Lords against the Bill, which increases the permitted borrowings by the Commission both for deficit financing and capital purposes, it was suggested—though not advocated—that a permanent subsidy might eventually be inevitable. This view was clearly held by the two main Opposition spokesmen, Lords Silkin and Shepherd. The former, after pointing out that about one-half the total passengers are carried to and from work unremuneratively, discussed the basic question as to whether they should be made to meet costs through higher fares, or whether they should be subsidised. Similarly, in regard to goods he asked whether none should be carried unless their economic costs were met: in other words, should the railways be operated commercially or as a public service? This has never been clearly resolved, but the question will have to be answered before long.

The additional £150 million now being voted to enable deficit financing to reach a maximum of £400 million may tide the Commission over the next three years, but only if the deficit does not exceed about £50 million a year. That should certainly be possible with the economies that are now being made by British Railways and London Transport. When the fund is exhausted, and the Commission is carrying the burden of these loans *plus* the accumulated interest on them, it would be rash to be confident that the railways would be paying their way and the Commission able to earn enough surplus to meet these heavier capital charges.

It was suggested during the debate that responsibility rested with the Government to decide which course should be followed: whether commercial considerations should predominate and unremunerative services be ruthlessly eliminated or charges adjusted to cost; or whether the railways should operate as a public service and their losses be met from public funds. The present compromise, although there is today emphasis on operation on a commercial basis so as to achieve financial equilibrium in 1962, cannot continue indefinitely. When the result of the current inquiry is available this decision will have to be taken. It is neither fair to the Commission nor to trans-

port users to delay it much longer. If the railways are to operate commercially there will have to be even more streamlining of the system than is as yet envisaged by the modernisation plan; and the public will have to accept some curtailment of services now provided. For the present it is unwilling to make the necessary sacrifice, as is shown by the objections against raising the ceiling for charges now being heard before the Transport Tribunal, and by the opposition that is evoked every time closure of lines is mooted.

If, on the other hand, it is accepted that the railways can never pay if the services demanded by the public are to be maintained, and that they should be provided as a public service, then there is no alternative to the regrettable expedient of a subsidy, with all its evil effects. Neither the Commission itself nor either of the major political parties has demanded a subsidy. The justification for the present method of financing deficits by way of loan is that the amount and period is limited and the target of breaking-even provides the incentive to economic operation. Remove that and the stimulus to efficiency goes with it. Decisions vital to the future of the railways have therefore to be taken shortly. They are not political decisions, in the sense of party politics, but economic ones of the greatest importance to trade, industry, and agriculture. It would be well if they could be made before a general election is fought. If they are not, transport policy might well be thrown back into the whirlpool of party politics in which it might become fatally submerged.

Facing Point Locking

THE success of the conventional form of railway with its two rails carrying wheels flanged on the gauge side was greatly aided by the ease with which it proved possible to pass from one line to another. Even with standard permanent way in the earlier days the construction of points called for much care and thought and, with their necessary counterpart, crossings, introduced dangers peculiar to themselves, which caused them long to be regarded with apprehension. Speed over them, especially in the facing direction, was invariably kept low.

As the number of stations and junctions increased, these restrictions prevented railways from being used to the best advantage. A tendency to ignore speed restrictions then showed itself and accidents inevitably resulted. Concentration of point and signal working in lever frames at first increased the danger, as it introduced the possibility of failed connections and of points being moved under, or immediately in front of, a movement. The anxiety justifiably felt by the leading engineers of the time, voiced especially by T. E. Harrison, of the North Eastern Railway, was referred to by Mr. O. S. Nock in his paper on facing point protection read before the Institution of Railway Signal Engineers on February 4. At the time when Harrison expressed his fears there were many accidents annually at facing points, as records prove. A great improvement was quickly effected once the seriousness of the situation was fully appreciated.

The locking and detecting of facing points then attracted much inventive talent and figured in many patents from 1866, when the locomotive engineer Stroudley had initiated the process. Mr. Nock traced these developments, which involved a considerable variety of devices. These gradually became simpler and left the plain plunger lock almost holding the field, though the Midland Railway never adopted it and used an "economical" mechanism peculiar to itself, with excellent results. The paper referred to some devices originating on the Continent, where in some countries the practice of working without independent shunt signals, still prevalent, made it essential to use equipment which could be "trailed" without damage, but which acted in that event on the apparatus in the signalbox to prevent an irregular clear signal being then exhibited for a movement over those points. Such equipment is unlikely to be seen in mechanical installations in this country, except in rare instances. Something probably can be said for adopting trailability in power installations at important locations where great dislocation of traffic can result from points being accidentally run through, say at the peak period.

Changing conditions are pointing also to revision of ideas as to the best way of effecting the locking action itself. Modified arrangements have been introduced in the last year or two with gratifying results. The question how far one should go in applying supplementary precautions against irregular movement of power points by using local track locking and/or revised circuit arrangements, designed to give greater security against the effect of faults, is engaging attention. Various views thereon found expression in the discussion on the paper which touched on all sides of what is an exceptionally important side of signal engineering and continued the treatment of it given before the Institution in 1936 by the late Mr. R. S. Griffiths. One thing is quite certain. Facing points must be made as safe as the latest techniques can make them. This is not merely a question of well-designed and strongly constructed equipment, perfectly adapted to the increasingly onerous conditions met with on the permanent way, but one also of first-class maintenance in service, without which the purposes of the most efficient devices can be defeated.

Closing Branch and Secondary Lines

THE withdrawal at the end of this month of passenger and goods services from all but short lengths of the Midland & Great Northern line of the Eastern Region is the largest such operation to have taken place so far on British Railways. The frequency with which branch and secondary lines and stations are being closed is increasing, but the withdrawal of railway facilities has been taking place over the past 40 years. The war of 1914-18 caused or hastened suspension of many passenger services largely because they could not compete with motorbuses and electric trams. The push-and-pull steam trains and petrol railcars placed in service by the railway companies before diesel traction had been developed could not regain traffic, often because stations were badly placed, and wartime conditions did not favour measures to improve facilities. Some services restored after 1918 were withdrawn later as unsuccessful. The depression of the 1930s resulted in many more closings, including goods stations, and withdrawals continued up to the outbreak of war in 1939.

It was clear after 1945 that further closings would be necessary and machinery for ensuring that the communities concerned would not suffer unduly by loss of railway facilities, was provided under the Transport Act of 1947, in the Transport Users' Consultative Committees. Under that Act, the duty of the British Transport Commission was to pay its way taking one year with another and to secure "an efficient, adequate, economical, and properly integrated service of public inland transport. . . ." The Transport Act of 1953 substituted for this last proviso the duty "to provide railway services for Great Britain" and "to provide in such places and to such extent, as may appear to the Commission to be expedient, other transport services." The emphasis today is on the railways paying their way rather than on providing services, but the wording of the 1947 Act gave latitude for withdrawal of services, and advantage was taken of this.

Whether any single closure of a length of line comparable to the M.G.N. Line is now contemplated, remains to be seen. There are lines such as that of the Scottish Region north from Dingwall to Wick, the loss of which might cause no great hardship to the communities served. In this case there are strategic objections. Many wayside stations are being closed on main lines, as is apparent from the frequent reports in our columns. Mr. G. F. Fiennes, Line Traffic Manager, Great Northern, Eastern Region, pointed out in his paper to the Metropolitan Section of the Institute of Transport last week that on the Great Northern Line it is planned to leave only eight passenger stations open in the 120 miles between Hitchin

and Doncaster. He also drew attention to what he believes to be a tendency to close duplicate lines, whether unremunerative or not in themselves. No decision to close any duplicate line which is in itself remunerative has been announced so far. On the other hand, the increase in line capacity made possible by electric and diesel traction, operation of vacuum-braked goods trains, re-signalling, improved permanent way allowing of higher speeds, may lead to concentration of traffic on lines so increased in capacity, and to consideration of closure of a duplicate main line. That would effect great reductions in maintenance costs. That is to presume that the duplicate line did not serve any important community not served by another route. The former Great Central main line between Aylesbury and Nottingham has been suggested as a case in point. It is to a great extent a through route, unlike the M.G.N. line, which is in a corner of Britain, but it is paralled by other through routes, the capacity of which is being increased.

The objections to closing lines and stations are considerable. There is first the moral obligation on the Commission to give services where there is no undue loss. Depriving large tracts of country of railway facilities of any kind is hardly in keeping with the Commission's moral obligations, whatever interpretation may be placed on the provisions of the Act of 1953. Withdrawal of a passenger service or closing of a goods station can create a passenger service or closing of a goods station can create the impression in a large area that the railways are going out of business. Potential consignors cease to think of the railways and it is often beyond the powers of commercial staffs to extend their sales activities over large rural areas. As lines and stations are closed, the overhead charges are increased on the remaining lines and installations. The value of branches as feeders also must be taken into account; in some cases the temptation to cut costs seems to have over-ruled consideration of the value of the line or station as a source of traffic.

By and large the process of closing in several economically developed countries, such as France, has slowed down in recent years. It may be urged that had the railways in several European countries been under the same statutory obligations as British Railways as to paying their way, they would have gone further in withdrawing services. That is not the case in France, where many branches still open are stated to be remunerative, taking into account their value as feeders. Much has been done by the French National and the German Federal Railways to reduce passenger operating costs on branches by introducing diesel railcars and railbuses. What has been done so far on British Railways is encouraging, though passenger traffic on some lines still does not pay even after a considerable increase in traffic occasioned by diesel services.

Self-Sufficiency for Indian Railways

THE drive initiated by the Indian Railway Board to encourage Indian industry to supply the railways is stated to have achieved considerable success. During five years ended March 31, 1958, railway purchases of equipment and stores produced in India increased nearly two-and-a-half times in value. From £48 million in 1953-54, the total value of indigenous purchases rose to some £120 million in 1957-58. The value of imports in 1957-58 was £47 million. These were confined to equipment and stores not manufactured in India, or to items such as steel, in short supply. A Development Cell in the Railway Board Stores Directorate has been responsible for helping industrial concerns to develop indigenous manufacture of stores and to expand manufacture of items already being produced. The prospective manufacturer receives additional help in the shape of designs and so on.

The greatest progress has been achieved in locomotives, carriages, and wagons. Self-sufficiency has been achieved already in steam locomotives. The Chittaranjan Locomotive Works and the Tata Engineering & Locomotive Works together are expected to turn out 268 locomotives a year when the second Five-Year Plan ends. There have been no imports of passenger coaches for some years, except multi-unit electric vehicles. The Railway Board points out that the first batch of 100 multiple-unit coaches is already being built in Calcutta. Indigenous production of coaches rose from 673 in 1951-52 to 1,255 last year. In 1947-48, 3,100 goods wagons were built in India. Annual production capacity is expected shortly to be 25,000. ,

Measures taken to encourage production of signalling material include technical assistance to manufacturers in India and modifications in designs to increase output. Demands for electrical signalling apparatus are expected to be heavy, and firms are being encouraged to increase production both by their own efforts and in collaboration with foreign manufacturers. Amongst the items for which India no longer depends on imports, because patent rights have lapsed or of indigenous capacity has been developed in collaboration with foreign firms, are thermic syphons, pressure and vacuum gauges, train lighting dynamos, and locomotive headlights. Heavy steel castings for locomotives are now being produced in India.

Wherever possible, the railways are revising standards and designs to facilitate production. Encouragement is being given to cottage and small-scale industries. The Railway Testing & Research Centre and the sub-centre at Chittaranjan are investigating raw materials. Indigenous tannins have been developed for treatment of locomotive water.

To economise in the non-ferrous metals which must be imported, research is stated to have helped in the replacement of the bronze used in bearings by cast-iron shells. Paints and emulsions at present imported are being replaced by paints and varnishes produced from cashew nut shells. Insecticides, temporary rust preventives, and anti-corrosive formulations have been developed which will make the Indian railways independent of imported stores of this type.

British Transport Commission Traffic Receipts

THE increase in British Railways passenger receipts for the first four weeks of the year compared with Period 1 of 1958 is slight. In view of the additional reduced fares introduced last year, and of the new diesel railcar services, a greater increase in passenger revenue might have been expected. The rise in ships passenger receipts is encouraging. The drop in provincial and Scottish bus traffics is in accordance with the recent trend, as is the marked decrease in London Transport road service receipts. The passenger revenue of the British Transport Commission for the four-week period is £184,000 less than a year ago, which is not encouraging in the light of the need to augment traffic receipts.

—	Four weeks to January 25		Incr. or decr.
	1959	1958	
Passengers—	£000	£000	£000
British Railways	8,400	8,258	+ 142
London Transport:			
Railways	1,851	1,823	+ 28
Road services	3,971	4,336	− 365
Provincial & Scottish buses	3,995	4,013	− 18
Ships	262	233	+ 29
Total passengers	18,479	18,663	− 184
Freight, Parcels & Mails—			
British Railways—			
Merchandise & livestock	7,085	8,158	− 1,073
Minerals	3,448	3,914	− 466
Coal & coke	9,717	10,551	− 834
Parcels, etc., by passenger train	3,750	3,744	+ 6
Total freight British Railways	24,000	26,367	− 2,367
Others*	3,861	3,937	− 76
Total freight, parcels & mails	27,861	30,304	− 2,443
Total	46,340	48,927	− 2,627

* Inland waterways freight, road haulage, and ships

The only heading under which the Commission's goods and parcels revenue shows an increase compared with 1958

is British Railways parcels revenue which rose very slightly, by £6,000. The British Railways freight, parcels and mails receipts as now published include those from collection and delivery. Merchandise, mineral and coal class traffics all show serious declines against last year's totals, which themselves were considerably below the corresponding figures for Period 1 of 1957.

Total receipts for the period from the Commission's road haulage, ships' cargo and inland waterways freight undertakings were slightly below last year's figure. The year has begun badly with a decrease in total revenue from carryings during its first four weeks of £2,627,000 compared with 1958.

BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS
PERCENTAGE VARIATION 1959 COMPARED WITH 1958

	Four weeks to January 25
British Railways—	
Passengers	+ 1·7
Parcels	+ 0·1
Merchandise & livestock	−13·1
Minerals	−11·9
Coal & coke	− 7·9
Total	− 6·4
Ships (passengers)	+12·4
British Road Services, Inland Waterways and Ships (cargo)	− 1·9
Road Passenger Transport, Provincial & Scottish	− 0·4
London Transport—	
Railways	+ 1·5
Road services	− 8·4
Total	− 5·4
Aggregate	− 5·3

Diesel Motive Power in South Australia

WITHIN 10 years of the introduction of the first diesel-electric shunting locomotive on the South Australian Railways, all the principal goods services on the 5-ft. 3-in. gauge lines are now worked by diesel locomotives. The broad-gauge diesel fleet has been increased to 38, compared with a total of about 190 steam locomotives. It includes 10 1,760-h.p. A1A-A1A diesel-electric main-line locomotives built at the S.A.R. Islington Workshops, with electrical equipment supplied by the English Electric Co. Ltd., and 16 Goodwin-Alco 1,750-h.p. Co-Co locomotives. A further four of the latter class are expected to be in traffic by the end of the current financial year.

These larger locomotives work passenger and goods services on the heavily graded main line between Adelaide and the Victoria border at Serviceton, which includes gradients of 1 in 45 and 30-ch. curves, over which two locomotives work in multiple, hauling 1,000-ton trains. A further application of diesel power now planned is on lines with lightly laid track. As recorded in our January 30 issue, tenders are being invited for 10 Co-Co main-line diesel-electric locomotives in the 900-1,000 h.p. range, with a light axleload. It is intended to use these locomotives in the first instance on agricultural lines.

More than half the population of the State lives in or near the capital. Electrification of the extensive Adelaide suburban lines has been considered but not found justified. As an alternative to electrification of the suburban service, diesel-hydraulic railcars were progressively introduced from December, 1955. These cars, which are powered by two 200-h.p. diesel engines and equipped with torque converters, were built at Islington. Forty-two are now in traffic and plans envisage a total of 60 in service by June, 1959.

At the present rate of progress, complete elimination of steam power from suburban passenger services should be effected in two years. The basic make-up is a three-car train consisting of two motorcars and one trailer, but it is intended to introduce some single cars in the off-peak periods.

The country passenger services from Adelaide to Mount Gambier, Moonta, Morgan, Port Pirie and Terowie are now operated by air-conditioned diesel-hydraulic railcars powered by two 250-h.p. diesel engines with torque converters.

The conversion of the 3-ft. 6-in. gauge lines to 5 ft. 3 in., with a view to eventual conversion to 4 ft. 8½ in., has meant concentration of the more important traffics on the broader gauge, on which considerable further developments in diesel traction can be expected as funds become available.

Letters to the Editor

(The Editor is not responsible for opinions of correspondents)

German Federal Railway Motive Power

February 3

SIR,—I would draw your attention to a serious error of fact on page 69 of your January 16 issue in the article "Problems of the German Federal Railway" under the sub-heading "Diesel-hydraulic Traction." I quote the relevant sentence: "Thus only three engines are now installed, the M.A.N., Daimler-Benz and Krauss-Maffei. . . ." This statement is incorrect as the three engines now installed are Maybach, M.A.N. and Daimler-Benz. Krauss-Maffei are not engine manufacturers.

I have listed Maybach first because there are far and away more Maybach engines on German Federal Railways than any other make. In the last five years, out of approximately 1,000 diesel engines purchased by the German Federal Railway, 900 have been Maybach.

Armstrong Siddeley Motors Limited has exclusive licence rights for Maybach diesel engines in the U.K. and is now producing Maybach engines in its Coventry factory.

Yours faithfully,

W. B. PRICE-OWEN
Sales Manager, Maybach Division

Armstrong Siddeley Motors Limited, Coventry

Southern Region Passenger Service Cuts

February 2

SIR,—I was interested to read the editorial note in your January 2 issue, regarding the recent reduction in the formation of certain Hastings line diesel services.

Although full diesel services have been operating only since last June and seaside travel was severely discouraged by the poor weather during the summer months, traffic has substantially increased over the Hastings line as a whole and this satisfactory feature is reflected also in the bookings at intermediate stations.

For example, receipts at Wadhurst, Battle and Robertsbridge in a recent quarterly period went up by nearly £2,000 (30 per cent) and, of course, these figures do not take into account the increased travel from outside the area to the diesel-served stations.

In writing, I would like also to take the opportunity to emphasise that the economy measures which you describe entail no reduction in the frequency of the service. Although passengers to and from intermediate stations between Tunbridge Wells Central and Crowhurst have, in some cases, to change at the former point, immediate connections are provided.

Yours faithfully,

P. L. A. WHITE
Line Traffic Manager

British Railways, Southern Region,
South Eastern Division, 61, Queen Street, E.C.4

THE SCRAP HEAP

Triangular Section Sleepers

Lifting rectangular sleepers for ballast packing was a serious problem in the early days of railways in Britain, because of settlement of track. John Pope, a civil engineer, described in 1842 an experiment on the South Eastern Railway, when a triangular-section sleeper of Baltic fir was used. Ballast could be rammed without lifting the sleeper or digging around it. These sleepers were cut diagonally out of a squared balk of timber. Each sleeper consisted of 2½ cu. ft. of timber, against 5 cu. ft. in the ordinary type. Sleepers were Kyanised under a pressure of 80 lb. Chairs were fixed by boring the seating holes with a "clamp gauge" with guide tube and auger. The wedge-sleeper had the major disadvantage of liability of disturbance in hard weather after rain, caused by frost heave in the ballast.

Mid-Victorian Carriage Decoration

Queen Victoria's saloon, built in 1869 by the London & North Western Railway, has been shown at the recent Furniture Exhibition at Earls Court, London, as an example of mid-Victorian interior decoration. The vehicle, of which the historical value is estimated at £45,000, was moved by rail from its temporary store at the Wolverton Works, London Midland Region, to Brompton & Fulham railway sidings, where it was lifted off its rail wheels and transferred to special bogies fitted with road wheels. British Railways and British Road Services (Pickfords) Limited arranged movement by road to Earls Court. The coach body and frame, 64 ft. long and weighing 25 tons, was lifted evenly by mechanical jacks from its bogies and then lowered into position on the special road bogies hauled by tractor.

The saloon was originally constructed as a pair of six-wheel vehicles. Designed by Richard Bore and built at Wolverton in 1869, they were the first British railway carriages to be connected by an entirely closed flexible gangway. In 1895 the two bodies were united on a single frame to form the present twelve-wheel carriage. The exterior, which was recently completely restored, is in the purple brown and off-white livery of the former L.N.W. Railway, the lower panels being decorated with the Royal Arms and insignia of the Bath, the Thistle, the Garter and St. Patrick.

Wrong Road

A signalman at Ashendon Junction last week mistook the 6.10 p.m. express from Paddington to Birkenhead for one from Marylebone, presumably the 6.18 p.m. to Sheffield, and diverted it in error to the former G.C.R. line to Grendon Underwood. The engine crew realised the mistake and stopped six miles beyond Ashendon Junction, near Grendon Underwood Junction. The train was hauled back by another engine, and continued from Ashendon Junction on its correct route 106 min. late.

Train v. Missile

A draw has been declared at the United States Air Force's new Vandenberg missile base in California in the battle of train versus missile. A formula for peaceful coexistence has been drawn up after conferences between Air Force and Southern Pacific Railroad officials. Although it is now America's most highly secret military establishment, Vandenberg base had to be built on either side of a busy railway. The lines passes through the base less than a mile from the platforms where America's biggest missiles and most ambitious satellites are to be launched.

The question of which has priority, train or missile, arose during the first firing at Vandenberg of a Thor intermediate range ballistic missile. Several trains were waved through while crews prepared the Thor for launching. Last night the Air Force said it had agreed with Southern Pacific to avoid missile firings interfering with train schedules. In return, the railway agreed that unscheduled goods trains would be delayed during firings.—*From "The Daily Telegraph."*

Effect of Railways on Weather

The day was anything but favourable, being one of those dull, leaden, sirocco days which were this year as frequent in Italy as rain seems to have been in England. In the Spring some of the papers prophesied that as the railroads would act as conductors of the electricity from one end of the country to the other, we should have no more rain. But this misfortune seems to have been spared us for this year at least.—*From a letter of Francis Cranmer Penrose, F.R.S., quoted in "Country Life," describing a journey through Italy in September,* 1845.

Day compartment of Queen Victoria's saloon, built in 1869 *and exhibited at the Furniture Exhibition at Earls Court. The ceiling is white quilted, and the soft furnishings are in blue moiré, silk*

"Holiday Haunts"

(*See editorial note in our January* 16 *issue*)

When the ice and snow are over
And the fogs and floods subside
And man's means of locomotion
Are again more dignified,
It's a sensible idea
To cast winter's cares aside
And indulge anticipation
With a British Railways "Guide."

Though the covers are entrancing,
It's as well to delve within;
We are often cautioned not to
Judge a sausage by its skin.
When the hounds of Spring run mutely
And the throbs of hope begin,
With the winter's chills scarce over,
Scanty costumes can seem thin!

If you find it rather puzzling
Settling where? and why? and what?
If you don't want things too chilly,
Nor, by contrast, all that hot,
You, at least, can hardly fail to
Find the one and only spot
For your holiday location
If you buy the blesséd lot.

A. B.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

SOUTH AFRICA

Diesel Locomotive Manufacture

The Union Carriage & Wagon Company, of Nigel in the Transvaal, has concluded an agreement with the General Motors Corporation to manufacture General Motors diesel-electric locomotives in South Africa. The locomotives will be built at the new Nigel works. Only diesel-electric equipment and controls will be imported to meet customers' specifications and requirements. All other parts will be manufactured in the Union. The range of traction available will be from 650 h.p. to 1,950 h.p.

The company is also geared up to produce smaller diesel locomotives of all gauges to the tested designs of its parent company in Australia, the Commonwealth Engineering Co. Ltd.

EAST AFRICA

Lake-Tanganyika Services

The three weekly service operated by the East African Railways & Harbours on Lake Tanganyika became a fortnightly service last month. This innovation was instituted to produce a faster passenger service between the Rhodesias and East Africa and also to allow a quicker turn-round of the new bulk oil lighter which was commissioned in mid December to carry oil from Kigoma in Tanganyika to Mpulungu in Northern Rhodesia, from where it is taken to Abercorn for distribution. Part of the oil carried by this lighter, it is now towed by the s.s. *Liemba* on all journeys, used to be transported from Beira through Portuguese East Africa. Apart from providing a faster passenger service the new timetable will allow a price reduction in the package tour which has operated from Dar es Salaam and other stations in Tanganyika during the past two years.

WESTERN AUSTRALIA

Relaying Progress

The linking up recently of new rails of the Northam-Kalgoorlie section at milepost 322 near Number 8 Pump, Dedari siding, completed relaying of the Eastern Goldfields Railway, begun in 1952. Apart from a few miles of new 63-lb. rail laid previously, the 314 miles of track has been laid in new 82-lb. rail welded into lengths of either 270 ft. or 90 ft.

Welding is carried out at the flash butt welding depot at Midland Junction. The lengths are then transported by rail to sites. Through experience and the use of mechanical equipment the rate of relaying has more than doubled in the last few years. The present team has established a record by relaying 4 miles 27 ch. in one working week. Because of the high cost of labour, mechanical equipment such as tampers, adzers, borers and spike pullers, was found to be the only means of ensuring economical track work.

Most of the rails being replaced are over 60 years old and some are the original rails laid during the construction of the line to Kalgoorlie in 1894-97.

As the work progressed, sleepers were renewed where necessary, and the old gravel ballast which had become powdery and unsuitable for packing, was replaced with new stone ballast.

Comparisons of the charts from the Hallade track recorder were made. They showed a great improvement in riding qualities of the track between Perth and Kalgoorlie. The recorder is run over all main lines three or four times a year.

The Great Southern Railway is now being relaid with welded rail and the team from the Goldfields line has moved to Pingelly. From this camp, relaying is to proceed as far as Narrogin. Work will then begin from the Albany end. The new track should reach Pingelly by next June.

Relaying of Metropolitan lines also is in hand. The Claremont-Subiaco section and 5½ miles from Perth to past Bayswater, and also 1½ miles of track near Guildford should be completed during the same period.

SOUTH AUSTRALIA

Passenger Service to Motor Works

New works of General Motors Holdens Limited are being established at Elizabeth, a new town being developed 15 miles north of Adelaide. This will entail the transfer of a number of the company's staff from the existing works at Woodville, near Adelaide. The S.A.R. is arranging a passenger service to and from the works at changes of shift to start probably in May.

NEW ZEALAND

More Railcar Services

The last regularly scheduled steam-powered provincial express trains in New Zealand will be replaced by diesel railcar services early in February. These are the twice-weekly trains on the Auckland-Hamilton-Rotorua and the Auckland - Hamilton - Tauranga - Taneatua routes.

It is proposed that the new railcar services will run each way daily Mondays to Fridays, with additional services on Friday and Sunday evenings. Two railcars leaving Auckland at 8.35 a.m. will run coupled to Morrinsville (104 miles) where they will be separated to run singly to Rotorua (173 miles) and to Te Puke (195 miles).

Rotorua will be reached in 5¼ hr. from Auckland; Tauranga, 181 miles on the run to Te Puke, in 5½ hr.; and Te Puke in a few minutes over 6 hr. The

Diesel Train Construction in Hungary

Five-car multiple-unit diesel train under construction at the Ganz Wagon & Machine Works for Jugoslav Railways

present express train service is allowed 6 hr. to Rotorua, 6 hr. 10 min. to Tauranga, and 7 hr. to Te Puke.

The railcar to Rotorua will connect with a road services coach to Whakatane, Taneatua, Opotiki, and Gisborne. Rail passenger service will be discontinued between Te Puke and Taneatua, at present only twice a week, but the daily railcar to Te Puke will be met by a bus for Whakatane and Taneatua.

UNITED STATES

Lehigh Valley Passenger Abandonment

The Lehigh Valley Railroad has applied to the Interstate Commerce Commission to permit complete abandonment of the passenger service which has been maintained by this railway for the past century. The L.V.R.R. has running powers into and out of the Pennsylvania Station at New York, and its 1,130 route miles of line extend from Newark, New Jersey, through Bethlehem and Wilkes-Barre to Buffalo, with branches serving Philadelphia, Rochester and other places of importance.

Actually the passenger service is on a small scale only, and the railway claims that its financial stability is being impaired by a daily loss of $13,000 on its passenger trains. There are one day and two night trains through over the 448 miles between New York and Buffalo (the former the historic "Black Diamond"), and two over shorter distances, with connecting branch trains. Other competing routes are available between New York and the principal towns served by the L.V.R.R., and also intermediately, so that the loss of the Lehigh Valley trains would have no very serious effects.

The date of abandonment sought was January 12, but the I.C.C. has ordered a continuation of service for a short period while coming to its decision.

FRANCE

Remote Control of Level Crossings

On the Nogent-Le Perreux to Champigny-sur-Marne line in the Eastern suburbs of Paris, an experiment is being carried out in the control of level-crossing movements of road traffic by television. Traffic over the crossing is light, consisting of 15 to 20 road movements and 20 trains a day, and previously the crossing had to be manned virtually permanently. Television cameras now enable a signalman at another box to supervise all movements and to operate the gates by remote control.

Bridging with Mobile Gantries

For many years the National Railways has been using mobile gantries, which move on light tracks laid on the permanent way, for the dismantling of track and the installation of lengths of prefabricated track. They are now being utilised for the installation or removal of 65-ft. lengths of girder bridging weighing up to 40 *tonnes* across gaps in the permanent way. The track on which the gantries move is first laid across the gap and extended for approximately the same distance on the side from which the work is taking place. Light girders are used as pillars to support the track across the gap. The gantries are then erected on the track at the side of the gap, and the girder bridge lifted from the diplory trolleys, on which it has been brought to the site, by pulleys on the gantries. The mobile gantries then move along the temporary track and lower the girder bridge into position. The reverse procedure is used where it is desired to dismantle bridges of this nature. The complete operation, including the erection and dismantling of the gantries and the temporary track can be carried out in approximately one hr. Where the weight to be lifted is less than 20 *tonnes*, two gantries are sufficient, but for heavier lifts of from 20 to 40 *tonnes* four gantries must be used.

WESTERN GERMANY

Colour-Light Signals

Twelve per cent of mechanical signals on the Federal Railway have now been replaced by colour-light.

IRELAND

Withdrawal of Services

Passenger and goods train services between Ballyhaise, Co. Cavan, and Arigna, and between Dromod and Ballinamore, Co. Leitrim, are to be withdrawn by Coras Iompair Eireann on April 1. Alternative services are being provided by road.

Conference of Traffic Managers

District superintendents of Coras Iompair Eireann attended a recent conference in Athlone on implementation of the commercial sales policy announced by Dr. C. S. Andrews, Chairman of C.I.E. The implications of the policy were explained and application discussed by Mr. David Stewart, Traffic Manager, who presided, and by Mr. E. A. Grace, Assistant General Manager.

Publications Received

The I.T.A. Its Inception, Foundation, and Development. By C. Courtney-Cramp. London: The Industrial Transport Association (Great Britain) Limited, 18, Fourth Floor, Evelyn House, 62, Oxford Street, W.1. 8¼ in. × 5½ in. 29 pp. Paper covers. Price 3s.—The history of the Industrial Transport Association is succinctly related. The names mentioned in connection with the activities during earlier years, the late 1920s, include those of Sir Robert Hadfield, Mr. B. Seebohm Rowntree, and Mr. A. J. MacIlwaine, Patrons, Mr. (later Sir) Patrick Hannon as President, and Mr. M. F. Barnard as a Vice-Chairman in the first formative year, 1928, and go far to explain the vigour with which the I.T.A. has pursued its aims. These include: directing attention to "the vital part that can be played by efficiency in transport and the solution of the fundamental problems of the production and distribution of goods and the economical movement of citizens"; improving technical administrative and general skill and competence and promoting the scientific education and training of those engaged in transport management. One of the ways in which these aims are being achieved is by the series of papers read at meetings. To judge by those given by railway officers, and referred to from time to time in this journal, the standard is high.

Grease Lubrication Problems.—A booklet, "Lubrication by Grease," issued by Germ Lubricants Limited, of Salford, gives comprehensive information on greases to suit particular applications and explains the terms used in grease specifications. A description is given of the considerations such as the several grease characteristics to suit the mechanical requirements of ball and roller bearings compared with plain bearings. Laboratory tests conducted for development purposes are described and illustrated. Hardness, tenacity, heat resistance, and water absorbent qualities of grease for different purposes, are discussed at some length. There is a section on ways of packing Germ greases, and a list of physical characteristics giving simple specifications to assist informed selection. The booklet is available without charge on application to Germ Lubricants Limited, Bloom Street, Salford, Manchester, 3.

Summer Holidays in Great Britain and Ireland 1959.—A fully illustrated programme issued by Thos. Cook & Son Ltd. and Dean & Dawson Limited offers a wide variety of holidays in seaside and inland resorts in all parts of the British Isles, ranging from Stenness, in the Orkneys, to Sark and from Mulrany, in Co. Mayo, to Margate. Railway travel is included in several tours, notably the Creative Tourist Agents' Conference tours from places in the Midlands and North of England to Scottish cities and to resorts in or near the Highlands. These afford travel by special C.T.A.C. trains with reserved seats, meals en route, and the services of couriers. There are also attractive inclusive holidays in Ireland by rail and steamer. Experience of some of the hotels recommended leads to the conclusion that excellent value is given for money.

Re-signalling of Paris Nord and Lille Stations

Introduction in conjunction with extensive track re-arrangement of P.R.S. type push-button signalboxes

Interior of the new all-relay signal-box at Paris Nord controlling the entire layout and replacing two M.D.M. type route-lever boxes

AS part of the electrification between Paris and Lille, referred to in our January 16 issue, accompanied at both those places and elsewhere by alterations to track layout, the French National Railways have introduced improvements in the signalling and telecommunications arrangements to increase safety and flexibility of operation. At the Gare du Nord, Paris, and at Lille passenger terminus new relay interlocking signalboxes have been brought into service.

Until 1935 the Paris terminus of the then Chemin de Fer du Nord lines in Paris was controlled by mechanical signalling. In that year it was worked from three signalboxes constructed in 1885, 1896, and 1899. These had reached the limit of their capabilities and it was decided to adopt all-electric power signalling using the so-called M.D.M., or Aster, type route-lever frames divided among two signalboxes, as the layout then fell easily into two separately operated portions, with little intermovement. The considerable amount of shunting by steam locomotives was thought better dealt with in this way, rather than from a single signalbox, at first contemplated.

The two new boxes, controlling 10 lines at the approaches and 28 platform lines, were opened in October, 1935 and February, 1936, as described in our issue of October 15, 1937. Track circuiting and colour-light signalling was provided throughout. By sectionalising the route setting so that for certain operations two levers had to be used instead of only one, the size of the frames was much reduced and 148 levers sufficed, 70 in No. 1 and 78 in No. 2 box, to control 794 distinct routes, for train and engine movements. This large number was necessitated by the many short engine track sections, to and from which movements had to be signalled. The number of levers was subsequently appreciably increased as alterations to the layout were made. The installation, one of the most complete of its type, was operated by a.c. except for the point motors, which were fed at 110 V. d.c. The letters M.D.M., initials of the originators of the system, Moutier, Dumartin, and Monard, were taken also to stand for *minimum de manœuvres* and *maximum de mouvements.*

New Layout

As electric working would allow of 15-16 coach main-line trains, a corresponding lengthening of platforms became necessary with much re-arrangement of the points and crossings at the north end of the station where space is restricted under the St. Ange overbridge. It became impossible to retain No. 1 box, controlling the western side of the station, with the main line departure platforms, and complete resignalling was essential.

It was decided to erect a push-button relay interlocking signalbox on the east side to control the entire layout of the type developed since the war and known as the P.R.S. design, or *poste tout relais à transit souple*, signifying that full sectional route releasing is provided. There are about 80 boxes of this class now in service on the S.N.C.F. system, some 10 in this recently electrified area.

The new Paris Nord box was brought into service in stages between October 15 and 24, 1958. The route setting buttons can, if desired, be made to control two movements by push-and-pull action. They number 319, excluding spares, and are grouped on a desk with illuminated diagram behind, on which 1,057 separate indications can

Interior of the Lille traffic controller's room separated by glass partition from the signalman. A similar arrangement is in use at Paris Nord

Type of impedance bond used for double rail track circuiting on 50-cycle electrified line

220-V. 3-phase point machine used in S.N.C.F. power signalling installations

appear. They control 493 distinct routes involving 102 sets of points, the motors for which are of the 220-V., three-phase type, 61 colour-light signals, and 97 track circuit sections, fed either at musical frequency, an arrangement much used now on the 50-cycle electrified sections, or by high voltage coded impulses, with impedance bonds.

The lower part of the signalbox is taken up almost entirely by the relay room, with 7,900 relays and wiring totalling about 360 km. (224 miles). The signalman's operating room above is separated by a glass screen from another housing the traffic controller for the Paris Nord area, whose staff can see the main illuminated diagram and are responsible for the general regulation of the traffic, provision of locomotives and stock, and so on. They are in telephonic communication with stations and signalboxes throughout their zone and, by loudspeaker intercommunication, with the signalman.

Lille Installation

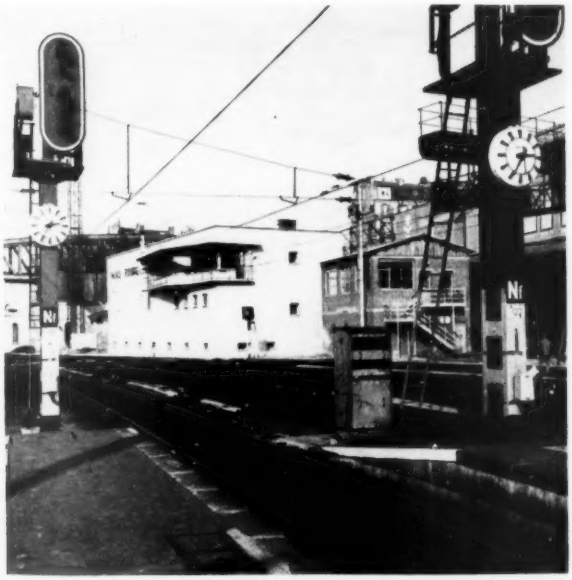
Electrification works at Lille necessitated large-scale improvements to the passenger terminus and the approach lines. The latter have now been simplified and better connections been formed by the creation of the Becquerel flyover, by which freight trains can now reach the yards without crossing on the level the main lines to Béthune and to Valenciennes. This, with the addition of five lines in the station and other alterations have removed much of the difficulty previously experienced in working the traffic, at times very heavy.

The original signalling, dating from 1913, consisted of three M.D.M. route setting hydro-pneumatic signalboxes, i.e., working by air under hydraulic controls, covering the principal station area and operating in conjunction with two "disengager" or platform supervisory boxes, as there was no track circuiting, fitted also with hydro-pneumatic apparatus. One box, however, was destroyed in the war and replaced by a mechanical one.

This, for its day, remarkable equipment, developed later into the M.D.M. electric system referred to above in connection with Paris Nord, lacked approach and route locking and other refinements insisted on at such stations today. A new single signalbox of P.R.S. type has replaced it. It was brought into service in July, 1958, shortly before the introduction of electric traction between Lille and Arras. Continuous track circuiting has made superfluous the platform supervisory boxes and enabled the whole of the working to be concentrated in the new relay interlocking scheme. The equipment is of the same pattern as that described above for Paris Nord, but the signalman's desk is smaller, with 191 working push-buttons controlling 277 routes. At Lille also there is a traffic controller's office separated by a glass partition from the signalman's room.

We are indebted to Monsieur J. G. Walter, Ingénieur-en-Chef, Direction des Installations Fixes, S.N.C.F., who is in charge of the signalling throughout the system, for the illustrations and information reproduced.

Exterior of new apparatus building and signalbox now controlling Paris Nord Station



Colour-light starting signals, and (beyond) the new all-relay signalbox

Pneumatic Springs for Japanese Rolling Stock

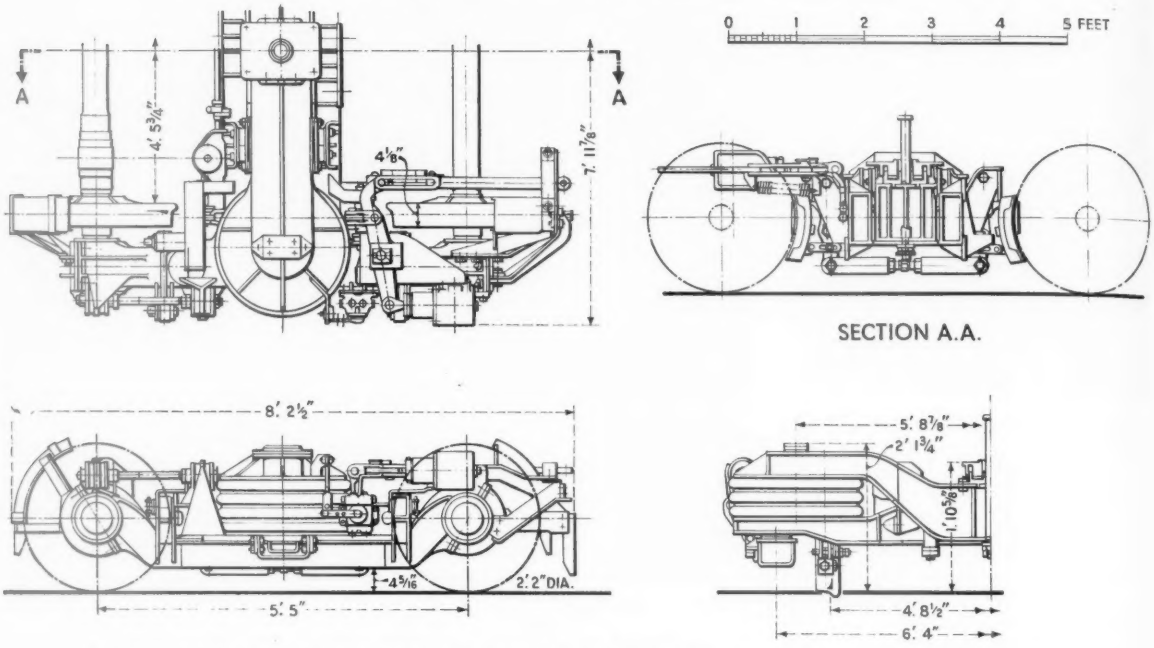
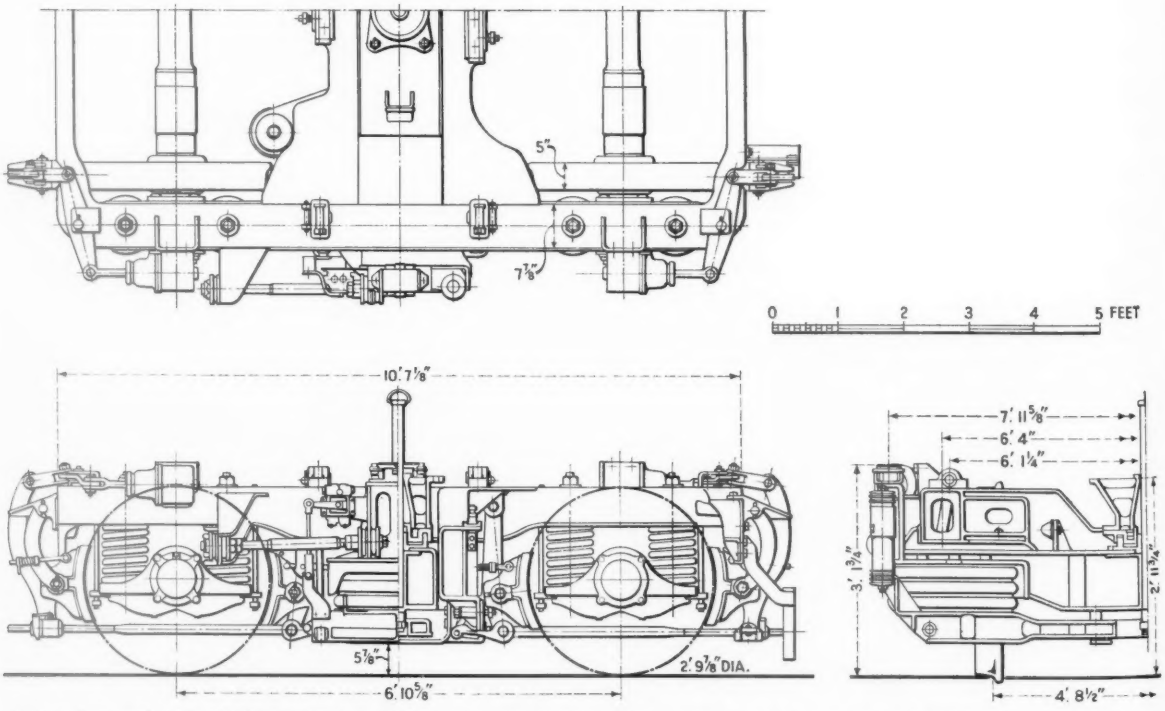


Diagram of the KS-53 bogie designed for the Nankai Electric Railway, showing general arrangement and principal dimensions



Elevation and plan of KS-51 bogie. This is the Kisha Seizo Kaisha standard design of bogie with pneumatic springs

Pneumatic Springs for Japanese Rolling Stock

Test results with J.N.R. passenger stock and comparison with coil spring bogies

PNEUMATIC springs have been developed rapidly in Japan over the last three years mainly due to the serious overcrowding experienced in suburban passenger trains in large cities such as Tokyo and Osaka. The loading of a car can vary from zero to 22 tons during the peak period. In general the highest and lowest heights of the couplers of Japanese rolling stock are 2 ft. 11 in. and 2 ft. 7⅛ in. respectively. The difference between the two limits is 3⅛ in., therefore the maximum deflection of the bearing springs is limited to as little as $\frac{3}{32}$ in. or less per ton of load per car. The deflection is very low compared with good riding stock in Europe and the U.S.A., where a deflection of $\frac{7}{32}$ in. to $\frac{5}{16}$ in. per ton of load per car is permitted.

A pneumatic spring supports a car body by inflating rubber bellows with compressed air. The pressure can be varied automatically, according to the variation in the load, by a height-control valve, so that the floor height can be kept constant.

Test Run

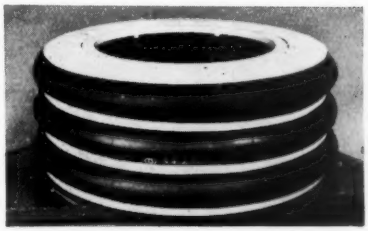
The first test run with stock equipped with air springs was carried out on the Tohoku Line near Tokyo in March, 1956. The air springs were manufactured by Kisha Seizo Kaisha and fitted temporarily on a diesel railcar. After satisfactory test results the Keihan Electric Railway decided to install these springs on its multiple-unit trains for the limited express service between Kyoto and Osaka. The first car so fitted was put in service in June, 1956, and this was followed by a further nine.

The National Railways has also made wide use of air spring bogies, and some 100 vehicles have been equipped including the stock for the multiple-unit electric train "Kodama" operating an express service between Tokyo and Osaka, and the "Asakaze" train-de-luxe operating as a limited express between Tokyo and Hakata. The "Kodama" was described and illustrated in our issue of December 19, 1958. When air springs were originally installed on the bogies of the Keihan Electric Railway they were fitted to the journal boxes. It was found, however, that sufficient height could not be obtained when the bellows were inflated because of the inclination of the bogie frame. The difficulty was overcome by fitting the pneumatic spring and its control valve on the bogie bolster.

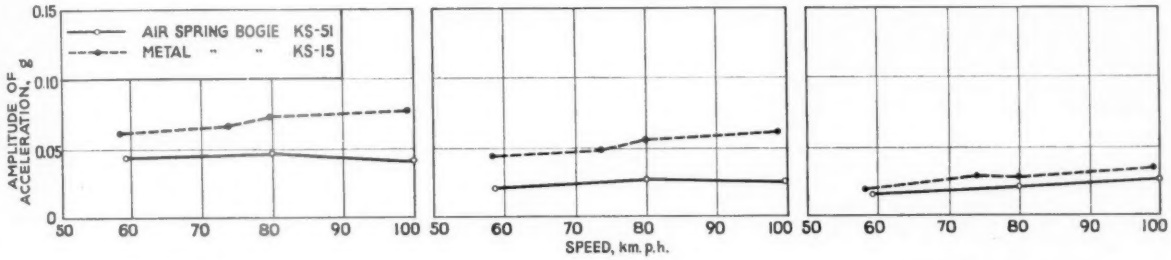
KS-53 Design

Kisha Seizo Kaisha Limited has also designed the air-spring bogies fitted to the newly-built street cars of the Nankai Electric Railway, Osaka. The diameter of the wheels is 2 ft. 2 in., and the wheel base is 5 ft. 5 in. By using the lateral flexibility of the air-spring bellows, the swing hangers of the bogie were eliminated. The tare weight of the car is 16 tons, and the output of the motors, four to each car, is 40 h.p. The general arrangement of the bogie, designated KS-53, is shown in the diagram on page 184.

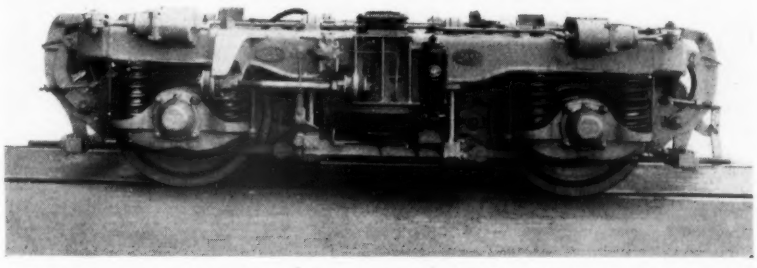
Tests carried out with a multiple-unit train fitted with Kisha Seizo Kaisha KS-51 air-spring bogies on the National Railways confirmed good riding qualities on the 3-ft. 6-in. gauge track at speeds up to 135 km.p.h. (84 m.p.h.). The increase in the frequency of vibration in the centre plate of the bogie was measured and compared with that of a KS-15 bogie with coil springs and oil dampers. The comparison is represented in the accompanying diagrams. In the KS-51 air-spring bogie the increase in the frequency of vertical vibration was less than 30 to 40 per cent and in lateral vibration less than 50 to 60 per cent mean value of the KS-15 coil-spring bogie. The mean maximum deflection in the air spring bellows while in motion was in the region of $\pm\frac{5}{16}$ in. The normal diameter and height of the bellows is 1 ft. 9⅛ in. and 7$\frac{5}{16}$ in. respectively, and the maximum working pressure is 5 kg. per sq. cm. (71 lb. per sq. in.). During tests the maximum variation in pressure was about ±0·2 kg. per sq. cm. (2·8 lb. per sq. in.). The bellows are made of oil-proof rubber and two-ply nylon tyre fabric.



Pneumatic-spring bellows for the KS-51 bogie. The diameter is 22 in.



Vertical vibration *Lateral vibration* *Longitudinal vibration*



KS-51 bogie, showing the pneumatic spring fitted to the bogie bolster, and coil springs on the journal boxes

Reconstruction of Underline Bridge on Enfield Town Line

Steel trestling and longitudinal steel waybeams to take weight during strengthening of abutments and preparation of bearings for new superstructure

The 82-ton up-line span being lowered into position with temporary lifting brackets

ONE of the chief features of the pre-electrification work on the Enfield Town line of British Railways, Eastern Region, is the extensive bridge reconstruction work involved. In all, 15 underline bridges are being rebuilt on this 10-mile section in readiness for the electric services scheduled to come into operation in 1960. An outline of the works involved was given in our issue of April 25, 1958. A major operation has been the reconstruction of bridge No. 1930 over Seven Sisters Road just south of Seven Sisters station. The original wrought-iron bridge was built over 80 years ago.

Although the actual span substitution was completed during two week-end possessions in December last, preparatory work had begun in May. This involved the erection of double rows of steel trestling and the insertion of longitudinal steel waybeams to take the weight of the existing bridge whilst strengthening of the abutments was carried out and bearings were prepared for the new superstructure.

New Superstructure

The latter consists of two separate parallel spans one under the up and the other carrying the down line. They are of steel box-type construction with double webs, top and bottom flanges and internal diaphragms. An interior passageway running the full length of each span provides easy access for inspection and maintenance. Fabricated in Glasgow by Sir William Arrol & Co. Ltd., the spans measure 87 ft. long × 11 ft. wide giving an effective span of 79 ft. The steelwork of each span weighed 64½ tons and water-proofing, tiling and concreting, added at Manor Road Yard, Stoke Newington, increased the weight to 82 tons.

Completion as Scheduled

Possession of the line was obtained from 5 p.m. on Saturday, to 4 a.m. on Monday, during the first two week-ends in December, the up-line reconstruction being carried out during the first weekend and the down line during the second. The work was duly completed within these periods and trains resumed running as was scheduled.

After removing the track and temporary waybeams from the up line on December 6, much preliminary work was necessary. It had previously been decided that platforms would be required to support the two 45-ton steam cranes to be used for the erection of the spans.

During the previous week British Railways' staff reinforced the embankment and placed timber cribs ready to support the outer outriggers of the cranes. Immediately after the removal of the track, a concrete distributing beam, weighing some 10 tons, was also laid partly on the ballast and partly on the new concrete abutment to support the inner outriggers.

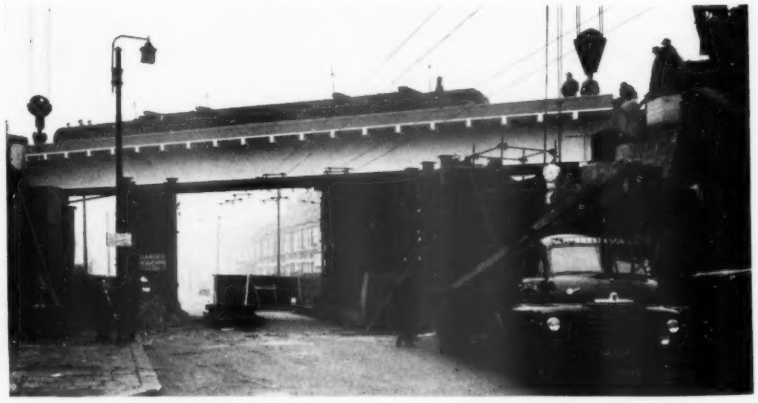
Dismantling and Erection

Oxy-acetylene equipment was then used to cut the bridge floor longitudinally along the centre and along one main girder of the old bridge to allow half of the floor and one main girder to be lifted out and removed by rail to Manor Road yard. The temporary waybeams were next removed by a road crane and, early on the Sunday morning, the new up-line span, mounted on a 100-ton flat wagon was brought on to the still-standing down-line span and then lowered into position by the two cranes.

Once the bridge was in position on its new bearings the permanent way was reinstated and ballasted, and temporary timber way-beams were placed over the abutments to enable the water-proofing and drainage to be completed.

The whole operation was repeated during the second week-end with the erection of the down-line span.

Sir William Arrol & Co. Ltd. was the main contractor for the work, which was carried out under the direction of Mr. A. K. Terris, Chief Civil Engineer, Eastern Region.



General view of the bridge after the up-line span had been lowered into position from the 100-ton wagon still standing on the down line

ELECTRIC RAILWAY TRACTION SECTION

Groundwork for Electrification

ELECTRIFICATION activities in 1958 on British Railways were concerned mainly with civil engineering and other preparatory work for new a.c. and d.c. projects. New equipment has been developed for investigating effects peculiar to the high-voltage a.c. system and associated with high-speed current collection from a light overhead line.

A noteworthy feature last year was electrification progress in Scotland, both in erection of overhead equipment for the first electrified surface lines north of the Border, in the Glasgow suburban area, and in experimental working of battery railcar services on the Aberdeen-Ballater branch. The first rolling stock to go into normal revenue service under the 25-kV. a.c. programme, consisting of multiple-unit sets intended ultimately for the Fenchurch Street—Southend route, will do so next Spring on the Colchester—Clacton—Walton lines of the Eastern Region, but an a.c. locomotive is already carrying out test and crew training duties on the Manchester—Styal section of the London Midland Region. This rebuild of the former gas turbine locomotive 18000, as mentioned in our issue of December 5, 1958, is equipped with glass bulb rectifiers of a type not intended for locomotive duty. Considering the various units being developed specifically for new a.c. motive power, it is surprising that presumably none of these was at a sufficiently advanced stage to be built into the locomotive and have the advantage of a mobile test bed in actual traction conditions. On the other hand, the first British silicon traction rectifier is now operating on the Lancaster—Morecambe—Heysham section of the L.M. Region, installed in the motor coach used previously for trials of a germanium rectifier.

Although the use of rectifiers is associated mainly with 50-cycle traction, there was another example during the year of low-frequency a.c. stock equipped in this way. These were the Budd lightweight coaches for the Pennsylvania Railroad described in our issue of September 26, 1958. In these vehicles the conversion of current to d.c. has allowed the use of small, high-speed motors mounted longitudinally in the bogies and driving through cardan shafts and bevel gears. Apart from the original Pennsylvania experimental motor coach of 1949, rectifiers have been used previously on 25-cycle lines in the U.S.A. either where inter-running with d.c. sections is required, as on the New York, New Haven & Hartford, or where heavy loads and gradients make the d.c. motor superior to the low-frequency a.c. machine, as on the Virginian Railway. The form of motor and transmission used in the Pennsylvania sets has been seen previously in the British-built cars for the Toronto subway but is a novelty in main-line electric rolling stock.

Limited electric working took place during the year on sections of the Paris—Lille main line of the S.N.C.F., and opening throughout took place on January 11. Some of the new Bo-Bo locomotives of Class "16000" are now in service. There is a close external similarity between them, the 1,500-V. d.c. "9200" class, and the dual-frequency (50/16⅔ c/s) prototype locomotives, the first of which also appeared during the year. In the original Valenciennes—Thionville 50-cycle locomotives a centre-cab arrangement was adopted to save the expense of duplicate driving controls in separate cabs, and to allow direct mechanical operation of the tap-changer. This temporarily gave 50-cycle traction an aspect of its own, but the ordinary traveller on the newly converted lines will see little evidence of the form of electrification in use.

Large orders for new rolling stock and electrical equipment were placed by London Transport in 1958, covering both surface and tube lines. Linked with the orders for Metropolitan Line coaches is the beginning of work on extending electrification from Rickmansworth to Amersham. When this is completed in 1960, the services will be worked by multiple-unit stock, and the need with the longer-distance trains for electric locomotive haulage to and from Rickmansworth, and steam haulage beyond, will disappear.

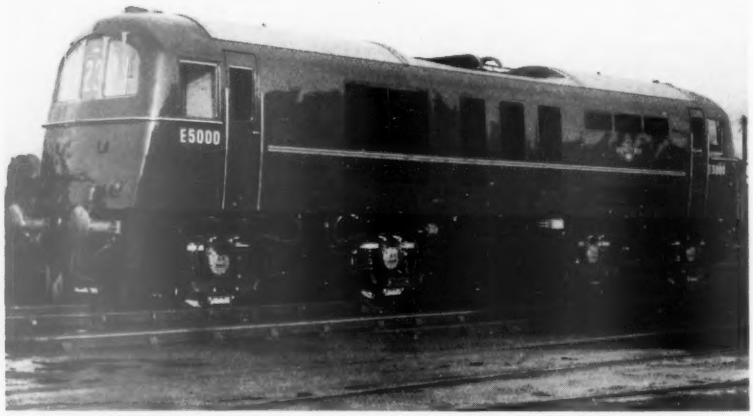
Germanium Rectifiers for First Conversion Sets

IN our January 23 issue we recorded the first contract placed by the British Transport Commission for converting d.c. rolling stock to run on the high-voltage 50-cycle a.c. system. This involves the two series of multiple-unit trains placed in service since the war on the 1,500-V. d.c. lines of the Eastern Region from Liverpool Street to Chelmsford and Southend Victoria, and will require the provision by the Metropolitan-Vickers Electrical Co. Ltd. of 124 sets of equipment. Of these, 92 will be needed for the three-car units built by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. and the Birmingham Railway Carriage & Wagon Co. Ltd. for the Liverpool Street-Chelmsford service (opened to Shenfield in 1949 and extended to Chelmsford in 1956); and 32 for the four-car units built at Eastleigh by British Railways with which the Liverpool Street-Southend service was opened as recently as December 31, 1956. The d.c. electrical equipments for the Chelmsford line trains were supplied by the English Electric Co. Ltd., and those for the Southend sets by the General Electric Co. Ltd. Various suggestions for the future of these trains have been made in the past, such as that some might be transferred to the Manchester-Sheffield line, or to the Manchester-Altrincham service, where the present electrical equipment dates from 1931 and was the first in this country for a 1,500-V. d.c. passenger service, a fact which may be considered to qualify it for early renewal.

Alternatively it has sometimes been asked whether the rolling stock might not be retained on its present duties and converted by the installation of rectifiers feeding the motors through the existing d.c. control equipment. Since none of the d.c. apparatus has yet seen ten years of service, such a plan seemed plausible, particularly for multiple-unit trains with rapid acceleration and consequently swift passage through the resistance notches. There have been no such half measures. The orders represent the largest yet placed for germanium traction rectifiers. It is only two years since the ordering of 35 germanium equipments for Manchester-Crewe rolling stock had this distinction, and now the quantity is 124 rectifiers comprising germanium cells in tray assemblies. These are to be supplied by the A.E.I. Heavy Plant Division at Rugby. That works was the source of the first germanium rectifier ever to be used for traction service, tests of which began on the Lancaster-Morecambe-Heysham of the London Midland Region in December, 1955, preparatory to regular service from April, 1956. This development sprang from the work on semi-conductors carried out by the Research Laboratory of the British Thomson-Houston Co. Ltd., a member of the A.E.I. group, as a result of which in 1953 the first germanium power rectifier in Europe was installed in the company's Mazda Lamp Works, where it occupied one sixth of the space taken by the previous glass bulb rectifier and proved to have an efficiency 6 per cent higher. Both from the successive orders for germanium traction rectifiers, and from the use of this material for auxiliary d.c. power supplies in the ex-gas-turbine locomotive now converted for 50-cycle working (see our December 5 issue), it is clear that the Commission is satisfied of the ability of this semi-conductor to meet service conditions. This suggests that difficulties once experienced in high ambient temperatures have been resolved, and that germanium has a more important future on British Railways than as a standby pending further development of silicon traction rectifiers.

Southern Region 2,500-h.p. Bo-Bo Electric Locomotive

Dual pick up design for Kent coast electrified services



Southern Region 2,500-h.p. electric locomotive built at British Railways workshops, Doncaster

THE first of a new type of electric locomotive for the Southern Region of British Railways has now been completed in the British Railways workshops at Doncaster. The initial order consists of 13 locomotives, required to handle freight trains of up to 900 tons over the heavily graded routes of the South-Eastern Division of the Region. They will also operate, to express schedules, fully fitted trains of 30 or more Continental train ferry vehicles, and passenger trains, including the "Night Ferry" which may load up to as much as 700 tons. These duties demand a locomotive with good adhesion characteristics, a large number of running notches, and a fairly wide range of traction motor field weakening.

Body Design

The body design is to the requirements of the British Transport Commission Design Panel in association with the Design Research Unit. The lines are intentionally unelaborate and the curved body sides conform with the British Railways standard carriage stock.

The bodywork is not intended to take any main stresses and is therefore of comparatively light and simple construction. It consists of a central equipment compartment, 38 ft. 2 in. long between partitions, with a driving cab at each end. There are no direct external doors to the cabs and access is gained through a door in the partition.

The cabs are of double skin construction for sound and heat insulation. The shells are built up of 16 s.w.g. mild-steel sheets welded at all joints and supported by a framework composed of tees, angles, and strip. The partition frames are constructed of angles and the whole cab frame is riveted to the underframe.

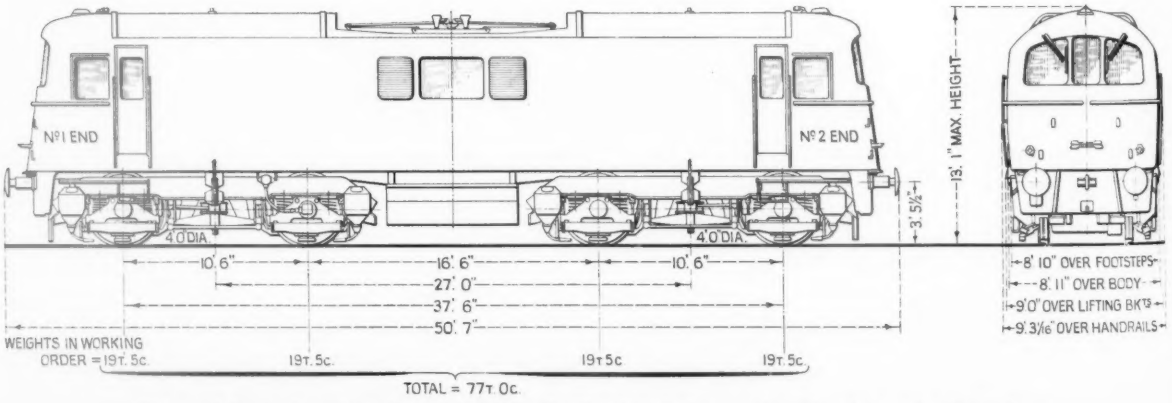
The inner skin of the cabs is made from hardboard and plywood, the latter faced with plastic panels. The sheet metal outer skin is lined with ¼-in. asbestos sheet. The partitions are covered, on the equipment compartment side, with 16 s.w.g. steel sheet, and on the cab side with plastic faced plywood. The spaces between are filled with asbestos.

The front cab windows are of Cyclone double-glazed type with ¼-in. toughened glass. The centre window is single-glazed and carries a two-figure route indicator. Each side of the cab is fitted with a full drop balanced light.

The main body sides are divided into three independent sections of about equal length. The joints between them are covered by straps. The sides are bolted to the light channel section members corresponding to the normal solebars. The roof between the partitions is completely removable, allowing all the major items of equipment to be lifted out vertically. It is divided into three sections, the centre one containing a well to accommodate the pantograph in the lowered position.

There is a cast aluminium alloy entrance door at each corner of the main compartment, adjacent to the partitions, fitted with a full drop light. There are louvres for ventilating the compartment on both sides of the locomotive, and a drop light at the centre of the locomotive on the gangway side. The non-gangway side is largely taken up with louvred air inlets for the booster, traction motor blower, and booster starting resistances.

A false floor over the whole area of the body provides a space for all the cable and pipe runs. The main floor in the equipment compartment is composed of aluminium treadplate $\frac{3}{16}$ in. thick, while the floor between the entrance doors and the cab is of wood



Side and front elevation of the 2,500-h.p. Bo-Bo electric locomotive, showing main dimensions

plank construction. The cab floors are covered with linoleum.

The generator of the large-capacity single-booster motor-generator set is connected in series between two parallel pairs of traction motors wound for full line volts. The output of this machine is 945 kW. at 1,750 r.p.m. and the motor of the set has a continuous rating of 1,360 h.p. at 675 V. The armatures of both machines are identical and interchangeable although the frames and field systems are necessarily different.

Electrical Equipment

The set actually consists of three machines forming a group carried on four heavy mounting feet. The frames of the motor and generator are bolted to a central housing surrounding a gear-type coupling, while the outer end plate of the generator carries an overhung auxiliary generator for control supplies and battery charging. A mechanical overspeed trip ensures protection from damage due to overspeed occurring under fault conditions.

The motor and generator armature shafts each carry a heavy flywheel to provide kinetic energy to help maintain the speed of the set during normal supply interruptions. Each flywheel has a powerful electro-pneumatically operated rim brake which can be used to stop the set quickly.

The four E.E.532/A type traction motors are six-pole machines with a 1-hr. rating of 638 h.p. at 675 V. They are fully bogie suspended and drive the axles through Brown-Boveri spring drives, similar to those used on the Swiss Federal Railways in the Re 4/4 and Ae 6/6 type locomotives. The gears and pinions are case-hardened and ground, the teeth have a helix angle of 8½ deg., and the gear ratio is 22:76 giving a maximum safe speed of 90 m.p.h.

Starting of the booster set is under the control of an electrically-driven camshaft and a series resistance is cut out in six steps under time control. This camshaft is also used to re-insert resistance during gap-operation, in readiness for accelerating the set back to normal speed on regaining the conductor rail.

Control of traction motor voltage is by "bucking" or boosting the line supply by variation of the booster generator excitation. An electrically-driven camshaft, controlled directly from the driver's master controller, provides for 33 running notches of which the last four control traction motor field weakening.

The master controller has two handles: the master switch which has four positions: off, forward, neutral, and reverse, and the main controller handle which has five positions: off, run-back, hold, notch-up, and run-up. An off-side controller, of simplified form, performs starting and setting-back operations. This controller has no run-up position.

To move the locomotive, the driver first starts up the booster set and when this is idling at full speed the master switch handle is moved to forward or reverse after which the main controller handle is moved to notch-up. The control camshaft advances one notch and stops. The driver can then notch up one notch at a time by returning the handle to hold and then moving it again to notch-up when the camshaft takes another step. Notching can continue right through to maximum or if required the driver can obtain higher acceleration by depressing a button on the controller handle which allows the handle to be moved beyond notch-up to run-up. As long as the handle is kept at run-up the control camshaft will continue to advance until the progression is arrested by returning the handle to hold, to which position it is spring biased. To reduce power the handle is moved to run-back, or if power is to be shut off completely, to off when the control camshaft runs back. The position of the control camshaft is indicated to the driver by a Desynn transmitter and dial indicator on the instrument panel.

The master controller has an interlocking device between the two handles and neither can be moved from the off position until a small key is inserted in the controller and turned. This key is similar to that used for the multiple-unit trains and diesel-electric locomotives.

Equipment Compartment

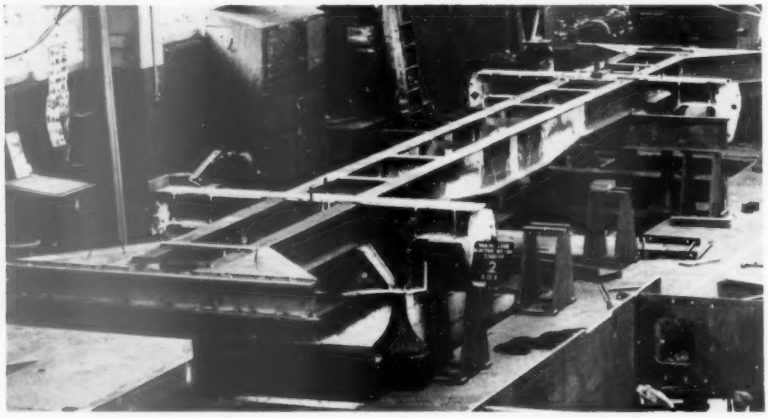
The centre of the equipment compartment is occupied by the motor-generator booster set, comprising three machines: booster motor, booster generator, and overhung auxiliary generator. The small overhung auxiliary generator provides control circuit and battery charging supplies and is a 110 V. d.c. machine with no bearings. The complete set is mounted on a welded steel support riveted to the main underframe longitudinals. Taper wedges, secured by bolts, prevent any endwise movement of the set.

Cooling air for the booster is drawn in through large louvres arranged in one side of the body, and is ducted to the motor, and to the main and auxiliary generators. After passing through the machines the air is expelled downwards through the floor. When the locomotive is passing through washing machines, or in snowstorms, the louvres can be closed by changeover flaps in the ducts, allowing air to be drawn from the inside of the body.

The blower, which supplies cooling air to all four traction motors, is located towards the No. 2 end of the equipment compartment, and is driven by a 32-h.p. motor running at 2,260 r.p.m. The fan has a capacity of 10,500 cu. ft. per min., and draws air through louvres in the body side and aluminium ducting, the latter containing a changeover system broadly similar to that for the booster. The delivery proceeds by a flexible connection to the top flange of a four-way breeches pipe bolted to the top plate of the underframe. From this the air is led by separate ducts to each of the four traction motors. The connection is made by concertinas of circular section moulded in synthetic rubber.

The electrical control equipment is mounted in two frames. The larger one, containing the main line-breaker and current limiter, booster notching camshaft, resistance shorting and traction motor contactors, the reverser and field tap switch for Nos. 1 and 2 traction motors, and associated relays, is positioned at the No. 1 end of the equipment compartment. It contains also a small control panel for line voltage control switches and fuses.

Interior of equipment compartment from No. 1 end, showing left, control equipment frame, and, centre, motor-generator booster set



Underframe, showing construction of longitudinal members in three sections

The smaller frame at the No. 2 end contains the booster field regulating camshaft, resistances and associated relays, with the reverser and field tap switch for Nos. 3 and 4 traction motors. Both frames are completely encased with dust-tight removable panels and doors.

The continuously-rated English Electric B.R.C. type booster starting resistances are contained in a compartment along one side of the body, adjacent to the No. 1 frame. A small auxiliary control panel containing the l.t. control switches fuses, and circuit breakers is located adjacent to the resistance compartment.

Reavell rotary type motor-driven exhausters are mounted at floor level on either side of the locomotive at the No. 2 end. To assist in the removal of the exhausters, the suction and exhaust pipe connections are made by flexible hoses, and removable panels are fitted to the body sides, to enable the complete machine on its bedplate to be taken out bodily.

A valve stand is arranged against the body side over the mains-driven exhauster and on this is concentrated as much as possible of the brake equipment.

A Westinghouse type "D.H.C. 3" motor-driven air compressor is located beneath the underframe at the centre of the locomotive. The compressor is a horizontal two-cylinder machine with two stages of compression and an intercooler. It draws air from inside the body of the locomotive through an air filter. The main and auxiliary air reservoirs are also mounted on the underframe between the bogies. The control and lighting battery consists of 72 Nife type ES.8 cells. It is housed in two boxes suspended from the underframe on either side of the locomotive.

Underframe

The underframe is a fabricated structure consisting essentially of two longitudinal members, spaced closely together on either side of the locomotive centre line, two dragbox assemblies, and two cross members at the bogie centre lines. Each longitudinal is built up of three sections of rolled steel joists: the end sections over the bogies are 6 in. wide by 12 in. deep while over the centre section the depth is increased to 16 in. The middle porton of the main members is strengthened by top and bottom plates, and the whole structure is stiffened by cross members and is pre-cambered.

The headstocks and dragboxes are built up of plate and I-section members to form a box-like structure with diagonal members to transmit the buffing load to the main longitudinals. Oleo-Pneumatic buffers are fitted in conjunction with the British Railways standard heavy duty drawgear equipped with rocking washers and large capacity rubber springs.

The stretchers at the bogie centres run the full width of the locomotive and are fabricated from sections to form a beam. The centre portion is extended downwards between the bogie frame transomes and carries on its lower face two spherical seatings to transfer the weight to the bogie bolster rubbing pads, spaced 4 ft. 9 in. apart. At its centre it carries the bogie pivot which is a steel casting.

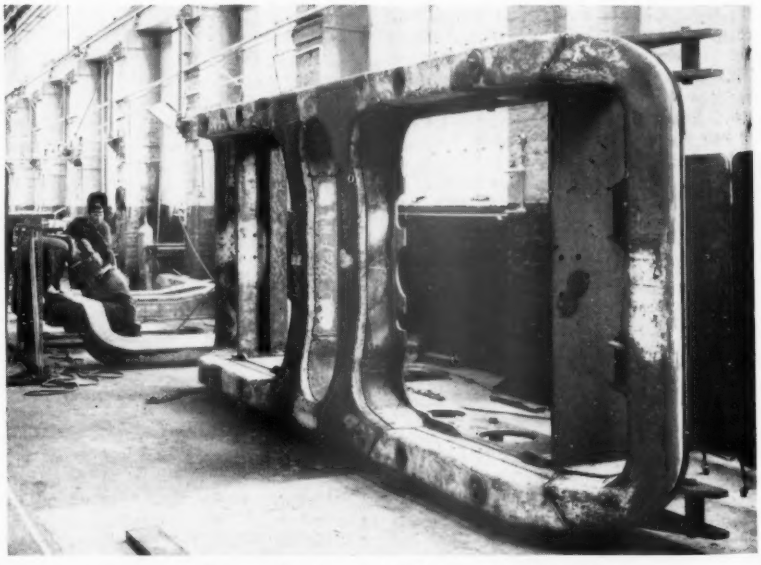
At the outer extremities of the stretchers provison is made for the attachment of lifting and jacking links. Four detachable safety brackets passing beneath the bogie frames retain the bogies in position, in the event of derailment, and when removed enable the superstructure to be lifted from the bogies. Brackets to carry the battery boxes and other details are cantilevered out from the main longitudinals. There are no solebars in the accepted sense, but light channel-section members, independent of the main underframe over their middle portion, act as supports and bottom stiffeners for the body sides.

The top of the underframe, which is flat, is covered by steel plates, $\frac{1}{8}$ in. thick, continuously welded in position, to form a dust-tight underfloor seal.

Bogies

The bogie frame is a welded structure of box section throughout, built up of flat plate and pressings. The side members, centre transomes and headstocks are fabricated as one homogeneous structure. The base is formed of $\frac{7}{8}$-in. thick plate and the sides and top in the form of an inverted "U" are made in $\frac{3}{8}$-in. and $\frac{7}{16}$-in. thick plates. Ordinary structural quality mild steel is used for ease of welding. Bosses are fitted in the side members for the reception of the circular axlebox guide pillars which are pressed in with a force of 20-30 tons. Integral brackets support the traction motors, brake cylinders, and other fittings.

The complete bogie frame fabrications have been stress relieved before



Bogie frame, showing welded box-section structure

machining to prevent subsequent distortion, following the machining of the bogies. The design of the axlebox guides, axleboxes, and primary suspension, was carried out in association with the Swiss Locomotive & Machine Works, Winterthur, and manufactured in the United Kingdom under licence.

The bogies carry the weight of the main underframe on spherically seated pads resting on the bolsters. These pads have both spherical and flat surfaces lined with non-metallic friction materials. The flat surfaces are arranged to slide when the bogie rotates and any tendency of the bogies to "hunt" is resisted by the friction linings.

The ends of the bolster bear on the centre buckles of two inverted laminated springs with 5 ft. centres. These give a relatively soft secondary springing of the locomotive and are placed at the maximum practical lateral centres to limit the tendency of the body to roll. Each end of the bolster springs is carried by four inclined swing links, 12⅝ in. long, suspended from the underside of the bogie frame. Each link has Spherilastik bushes at both ends to eliminate wear, and a rectangular rubber pad at the spring seatings.

Lateral movement of the bolster relative to the bogie frame is limited to 1½ in. each way by a rubber buffer. The first two locomotives are being fitted experimentally with Woodhead-Monroe hydraulic dampers to damp out lateral oscillations of the bolster. Traction and braking loads are transmitted from the bogie frame to the bolster by two horizontal links, 2 ft. 6 in. long, fitted at each end with Spherilastik bushes

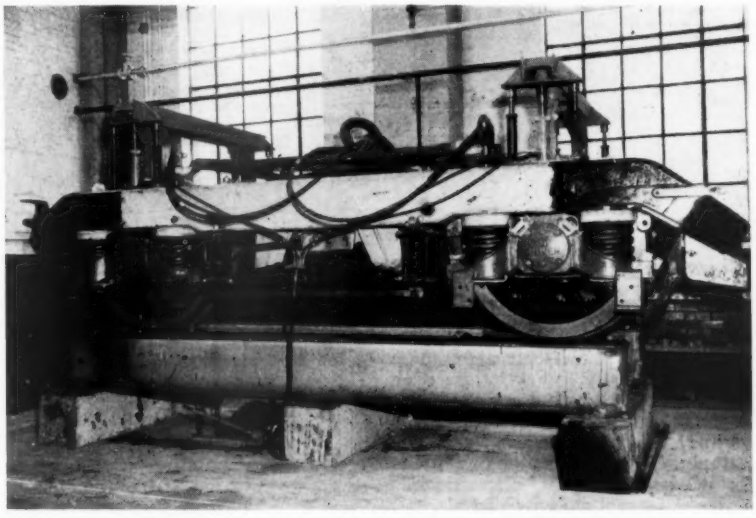
Of the 13 locomotives being built initially seven are to be fitted with axleboxes having Timken tapered roller bearings while the remainder are to have S.K.F. self-aligning roller bearings. The axlebox carcases are steel castings and incorporate, on either side, extensions to form seatings for the helical bearing springs and concentric guide bushes. Each axlebox has integral brackets to carry a teak shoe beam which supports, at its centre, a collector specially designed for the limited space available. The axleboxes also incorporate housings for the insulated earth return brushes, which bear on copper rings spigotted into the outer faces of the wheel bosses. The axleboxes themselves are insulated from the frame, thus ensuring that no current can be conveyed through the roller bearings.

The guide bushes, which slide on the circular axlebox guide pillars, consist of a phosphor bronze sleeve pressed into the inner member of a specially designed Silentbloc, the outer member of which is carried in an annular housing forming part of the axlebox casting. The working surfaces are continuously lubricated from an oil reservoir and are protected against the ingress of dirt and water.

The Silentblocs cushion longitudinal and lateral shocks, allow for slight discrepancies in the guide pillar centres, and act as insulators between the bogie frame and the axleboxes. In the case of the Timken bearings they also allow the axleboxes to tilt as necessary and for this reason a shorter, thicker ring of rubber is fitted with these, than with the S.K.F. bearings which are self-aligning.

The large diameter coil bearing springs are manufactured from round section ground bar in chrome-vanadium steel, and are designed for a low stress to ensure long life. Rubber auxiliary springs are fitted at the top of the coils, and in addition to their usual function they provide electrical insulation at this point. Spring-loaded friction dampers of S.L.M. type are fitted in parallel with each bearing spring.

The spoked type wheel centres are steel castings with the tyres retained by Gibson rings. Provision is made in the wheel bosses for oil-injection to facilitate the removal of the wheels from the axle, should this be necessary in order to remove the flexible drive.



Welded box form bogie under test with spring loading device

Two brake blocks act on each wheel and each block is actuated by a Westinghouse individual brake cylinder, incorporating an automatic slack adjuster. A hand parking brake, operated from the adjacent cab, is connected by rigging to one block on each wheel. Air operated ejectors apply sand to the leading wheels of both bogies in either direction of travel from boxes attached to each corner of the bogie frames.

Braking

The locomotives are fitted with compressed-air brake equipment and the system is one in which the vacuum brake, when in use on the train being hauled, is compressed-air controlled. Provision has been made for the haulage of Continental stock using an air brake on the train, and this feature also enables dead multiple-unit stock to be hauled, should this be necessary.

The principal brake valves are of the Metcalfe-Oerlikon design; the normal driver's brake valve used for controlling the locomotive and train gives a graduated control of the automatic air brake and operates the automatic vacuum brake on the train when so fitted, through an air-vacuum relay valve. The duplicate driver's brake valve fitted on the right hand side of the cab is connected to that in the normal driver's position by a Teleflex. Also on the driver's desk is a straight air brake valve which gives a direct brake application on the locomotive only. This is mainly for light engine and shunting movements.

A Westinghouse D.H.C.3 two-stage motor-driven compressor provides compressed-air at 105 lb. per sq. in. and vacuum is obtained from two F.R.U. 5¼ in. × 10 in. Reavell exhausters. These are only run when vacuum fitted trains are being hauled, one exhauster, taking its power supply from the mains, operates continuously at low output for maintaining, while the second exhauster obtains its power supply from the batteries and may be used when the main supply is not available. For rapid release, however, both exhausters are brought into operation, at full output, with weak field.

Cab Equipment

The layout of the two cabs is identical. There is an adjustable tip-up seat for the driver on the left hand side, with a simple tip-up seat on the opposite side for a second occupant of the cab. Desks are fitted on both sides, that on the driver's side embracing the main controller and driver's brake valves. A sloping instrument panel contains air pressure and vacuum gauges, a speedometer, ammeter, and notch indicator. A two-level deadmans pedal is arranged in a recess in the desk, enabling the loco-

motive to be driven from either the seated or standing position.

The desk on the right hand side mounts the hand brake wheel, and contains a simplified controller and a brake valve. A deadmans pedal is below the desk, thereby enabling the locomotive to be driven from this side when necessary for shunting and particularly setting back movements. An indicator light and switch panel is arranged between the two desks underneath the route indicator box.

Other fittings include compressed-air operated window wipers, sun visors, a pigeon hole for time tables and a train heating switch box and indicator. Electric heaters are fitted under the seats, and an air extractor is fitted to the cab roof. Provision is made in the layout of the cab for the installation at a later date of British Railways standard A.T.C. equipment.

The main characteristics are as follow:—

Weight in working order	77 tons
Radius of minium curve	4 ch.
Nominal supply voltage	675 V. d.c.
Maximum service speed	90 m.p.h.
Gear ratio	76 : 22
Traction motor voltage	675 V.
1 hr. rating of motors	638 h.p.
1 hr. rating of locomotive	2,552 h.p.
Tractive effort nominal max.	43,000 lb. at 25 per cent. adhesion
Tractive effort, 1 hr.	20,000 lb. at 47 m.p.h.
Control voltage	110 V.
Control air pressure	70 lb. per sq. in.
Generator rating (continuous)	945 kW. 1,400 A., 675 V.
Cooling air	6,500 cu. ft. per min.
Auxiliary generator EE.910/B	9·2 kW., 83·5 A., 110 V.

The design was carried out under the direction of Mr. W. J. A. Sykes, Chief Mechanical & Electrical Engineer, Southern Region, in consultation with Mr. R. C. Bond, who was the Chief Mechanical Engineer, British Railways Central Staff, at the time the design was prepared, and Mr. S. B. Warder, Chief Electrical Engineer, British Railways Central Staff, British Transport Commission. The design of the mechanical portions of the locomotive was prepared in the locomotive drawing office at Brighton, while the original conception of the locomotive and the supervision of the design of its power equipment were by the electrical engineering staff at London Bridge.

The principal sub-contractors are as follow:—

Electrical equipment	English Electric Co. Ltd.
Buffers	Oleo Pneumatics Limited
Bearings and axleboxes	British Timken Limited; Skef'ko Ball Bearing Co. Ltd.
Air compressor	Westinghouse Brake & Signal Co. Ltd.
Exhausters	Consolidated Brake & Engineering Co. Ltd.
Windows	Beckett, Laycock & Watkinson Limited
Doors	Lightalloys Limited
Door fittings	Hallam, Sleigh & Cheston Limited
Copper pipes and fittings	Yorkshire Imperial Metals Limited
Flexible drives	Swiss Locomotive & Machine Works
Brake cylinders and slack adjusters	Westinghouse Brake & Signal Co. Ltd.
Window wipers	Trico-Folberth Limited
Roof ventilators	Weathershields Limited
Plastic panels	Bakelite Limited; Formica Limited
Instruments	Smiths Industrial Instruments Limited; Smith Bros. & Co. (Hyson) Ltd.
Rubber bushes	Metalastik Limited; Silentbloc Limited
Blower fan	Aerex Limited
Brake equipment	Davies & Metcalfe Limited; Westinghouse Brake & Signal Co. Ltd.
Flexible connections for air ducts	Rediweld Limited
Draw springs	Spencer, Moulton & Co. Ltd.
Helical bearing springs	Samuel Fox & Co. Ltd.
Rubber springs	Andre Rubber Co. Ltd.
Traction motor bellows	Huntingdon Rubber Co. Ltd.
Battery	Nife Batteries Limited
Oscillation dampers	Jonas Woodhead & Sons Ltd.
Speedometer	Smiths Industrial Instruments Limited
Fire extinguishers	Pyrene Co. Ltd.
Friction pads	British Belting & Asbestos Co. Ltd.; J. W. Roberts Limited
Blower for cab ventilation	General Electric Co. Ltd.

Electrification of Great Northern Suburban Lines, Eastern Region

Projected conversion of Hitchin-Cambridge branch to Royston: clearance difficulties between Finsbury Park and Moorgate

THE Great Northern main line of British Railways, Eastern Region, from Kings Cross to Doncaster is to be electrified at 25 kV., 50 cycles, on open sections, and at 6·6 kV. through tunnels and on sections with many tunnels and overline bridges, to give adequate clearance. In conjunction with the North Eastern Region, conversion is envisaged from London to Leeds and York. The passenger suburban area extends along the main line from Kings Cross to Hitchin, 32 miles, of which the northernmost 15 miles, from, say, Hatfield northwards, promise to afford the most remunerative traffic in relation to revenue and operating costs.

North of Hitchin, on the main line, the country is mainly agricultural, but along the Hitchin-Cambridge branch, besides the existing towns of Letchworth and Baldock, the population is likely to increase. This should afford residential traffic to and from London, if the train service were fast and frequent enough, and also local traffic to and from Letchworth and other centres for daily work, shopping, and so on. Plans are under consideration for extension of electrification from Hitchin, which is not a convenient station for reversing electric trains, to Letchworth, 35 miles, and Royston, 45 miles from Kings Cross, with intermediate stations at Baldock and Ashwell. An interval service between Kings Cross and Royston would be worked by multiple-unit trains passing stations in the inner suburban area.

Royston is some 10 miles from Shepreth Junction, where the line from Hitchin joins the Great Eastern Line, Liverpool Street to Cambridge main line. Electrification of the latter is in progress between Liverpool Street and Bishops Stortford. If it were extended to Cambridge, conversion between Shepreth and Royston would afford an alternative electrified route between London and Cambridge.

Enfield-Hertford-Stevenage Line

The loop line from Wood Green to Enfield Chase, Cuffley, Hertford North, and Stevenage, where it rejoins the main line, is a relief to the main line, and conveys a considerable peak-hour suburban traffic between stations between Enfield Chase and Wood Green, and three London termini, Kings Cross, Moorgate, via the "Widened Lines," and Broad Street via Canonbury and Dalston.

There is no intention to re-open the Finsbury Park to Highgate, Alexandra Palace, Finchley, and High Barnet lines for Eastern Region suburban traffic. The Great Northern Line electrified lines will consist only of the main line and the Enfield-Stevenage loop, with the possibility in addition of what is now the Northern City Line of London Transport, between Finsbury Park and Moorgate.

All multiple-unit suburban trains working over the main line to and from Hitchin or beyond would terminate, according to present plans, at Kings Cross main-line terminus. Consideration is being given to operating Enfield line trains over the Northern City line to and from Moorgate.

The Northern City Line was built at the end of the last century to accommodate suburban stock of the former Great Northern Railway. The dia. of tunnels is 16 ft. This does not afford clearance for overhead current collection at 6,600 V. Operation of a.c. electric trains over this section would necessitate, probably, a lower voltage, with side collection.

To provide a service between Moorgate and Finsbury Park sufficiently frequent for what would remain in effect an urban underground line some trains from Moorgate would terminate at Finsbury Park, instead of continuing to Wood Green and the Enfield line.

No decision has been taken as to the details of suburban electric services on the G.N. Line. Engineering work in conjunction with electrification has been proceeding for some time, on the main line and Hertford loop, as described in this journal. The most important operation is the tunnelling on the main line between Greenwood and Potters Bar, affording four through tracks between Kings Cross and the Welwyn Viaduct.

RAILWAY NEWS SECTION

PERSONAL

Mr. Q. M. A. Hussain, Deputy Chief Controller of Stores, North Western Railway of Pakistan, has been appointed Chief Mechanical Engineer, Eastern Bengal Railway.

Mr. A. W. C. Crossman, Assistant Chief Mechanical Engineer, South Australian Railways, who, as recorded in our January 23 issue, has been appointed Chief Mechanical Engineer, joined the South Australian Railways as an apprentice fitter & turner in 1921. On completion of his apprenticeship, Mr. Crossman was awarded the railways' Commissioner's Scholarship. He studied at the South Australian School of Mines, where he completed his Associate Diploma in Mechanical & Electrical Engineering, and was appointed an Engineering Assistant in the Car Drawing Office at Islington Workshops in 1930. In 1935 he was transferred to the Motor Shop Drawing Office, on rail motor design, and, in 1937, was appointed Motor Engineer. In 1944, he was promoted to be Assistant to the Works Manager, and, in 1946, was appointed Chief Draughtsman. In this position he was responsible for design work associated with manufacture of sleeping cars, and the Class "900" diesel-electric locomotives. Mr. Crossman was appointed Works Manager in 1952, Assistant Chief Mechanical Engineer in 1954, and Chief Mechanical Engineer last June.

Dr. C. R. May, Medical Officer, Manchester, London Midland Region, British Railways, has been awarded the Diploma of Industrial Health of the Society of Apothecaries of London.

Mr. R. J. Chambers, Indoor Assistant (New Works), Signal Engineer's Department, York, North Eastern Region, British Railways, has retired after nearly 50 years' service.

Mr. G. Byrne has been appointed Commercial Manager, Coras Iompair Eireann.

Mr. C. S. Bingham, Mechanical Engineer (Works, Railway), London Transport Executive, has been appointed Mechanical Engineer (Works & Contracts). Mr. E. P. Lumley, Divisional Engineer "B" (Railways), has been appointed Assistant Mechanical Engineer (Works).

L.T.E. Appointments

Mr. H. T. Hutchins, General Superintendent (Traffic, Railways), London Transport Executive, has retired, and the following changes in the Department of the Operating Manager (Railways) are announced: Mr. Alex. J. Webb, General Superintendent (Staff & Training, Railways), becomes Assistant Operating Manager (Railways); Mr. R. J. Smith, Superintendent (Traffic), and Mr. W. J. Moore, Superintendent (Staff), become Principal Executive Assistants. Reference to the re-organisation is made elsewhere in this issue.

Mr. J. J. O'Dwyer, Commercial Superintendent, Coras Iompair Eireann, has retired. He is succeeded by Mr. D. Delaney.

Mr. Eric Merrill, M.B.E., Deputy Director of Public Relations, Ministry of Defence, who, as recorded in our January 2 issue, has been appointed Chief Public Relations Officer, British Transport Commission, succeeds Mr. D. S. M. Barrie, M.B.E. who was appointed Assistant Secretary General to the Commission last August. Mr. Merrill learned his journalism mainly in South Yorkshire and, from 1941, served with the Army in East Africa, Egypt, North Africa, Palestine, Syria and Lebanon. In 1945 he became Public Relations Officer to 6th Airborne Division and, in March, 1946, was appointed head of Army Public Relations for Palestine & Transjordan. He wrote the war history of 6th Airborne Division and other war histories. From July 1947 he was Deputy Assistant Director of Public Relations, Southern Command, and became Principal Information Officer at the War Office in 1955. Two years later he became Deputy Director of Public Relations at the Ministry of Defence.

Mr. R. Bonavia, Principal Officer (Modernisation), General Manager's Office, Liverpool Street, Eastern Region, British Railways, has been appointed Director of Studies, at the British Transport Staff College, Woking.

Mr. A. W. C. Crossman
Appointed Chief Mechanical Engineer, South Australian Railways

Mr. Eric Merrill
Appointed Chief Public Relations Officer, British Transport Commission

Mr. W. J. Hartnell

Appointed District Traffic Superintendent, Exeter, Western Region

Mr. F. G. Dean

District Traffic Superintendent, Plymouth, W.R., whose position is enhanced

Mr. D. L. Pride

Appointed District Operating Superintendent, Birmingham, Snow Hill, W.R.

Mr. W. J. Hartnell, M.Inst.T., District Commercial Manager, Newport, Western Region, British Railways, who, as recorded in our January 2 issue, has been appointed District Traffic Superintendent, Exeter, began his career with the Great Western Railway in the Enginering Department, Bristol, in 1924. From 1927 to 1931 he recived special training in all departments of the railway, mostly in South Wales. He subsequently became Goods Agent, Newham. As an Officer in the Royal Engineers (Supplementary Reserve), he served in France, and later with the Royal West African Frontier Force, in Nigeria and the Gold Coast, primarily on transportation duties. At the end of hostilities, he spent over a year in the Russian Zone of Germany, in connection with the opening and running of the railway line of communication to Berlin. On demobilisation, Mr. Hartnell underwent a short training course and was later appointed Goods Agent, Paignton. Then followed appointments as Acting Goods Agent, South Lambeth; Assistant Goods Agent, Paddington; and Goods Agent, Worcester. In 1950, he became Assistant District Commercial Manager, Exeter, and four years later Assistant District Commercial Manager, Bristol. Mr. Hartnell became District Commercial Manager, Newport, in 1957, the position he now vacates.

Mr. A. Quadir has been appointed Deputy General Manager (Planning), North Western Railway of India.

Mr. L. J. Boucher, Signal Engineer, Southern Region, British Railways, will retire at the end of this month. He will be succeeded by Mr. J. F. H. Tyler, Assistant Signal Engineering Officer, British Railways Central Staff.

Mr. C. C. Adams, Vice-President of the Rolling Stock Manufacturers' Association of Australia, has resigned. He is succeeded by Mr. J. Mc Ghee, of Clyde Industries Limited. Mr. E. Tomlinson, of Tomlinson Steel Limited, has joined the Management Committee of the Association. Mr. W. F. Marien has been appointed the Association's Secretary.

Mr. F. G. Dean, M.B.E., M.Inst.T., District Traffic Superintendent, Plymouth, Western Region, British Railways, whose position, under the regional traffic reorganisation, has been enhanced, joined the Great Western Railway, in 1925, in the Traffic Department. After experience in all branches of station working in the London Division, he was moved to the Divisional Superintendent's Office at Paddington. In 1939, he became Junior Assistant to the Divisional Superintendent, Birmingham, Snow Hill. Two years later he moved to Swansea in a similar capacity, later becoming Chief Clerk in the Swansea Divisional Superintendent's Office. In 1942, he returned to Birmingham as Assistant Divisional Superintendent. In 1945, Mr. Dean was appointed Assistant to the Chairman of the Operating Committee of the Railway Executive Committee. In this capacity he served on various Committees at the Ministry of War Transport. On nationalisation, in 1948, he became Assistant (Operating) to the Functional Member for Operating at the Railway Executive. He was appointed District Operating Superintendent, Worcester, in 1952, and District Traffic Superintendent, Plymouth, in November, 1953. Mr. Dean is a director of the Sutton Harbour Improvement Co. Ltd., and a Commissioner for Fowey Harbour & Looe Harbour; and an Executive Council Member of the Plymouth Chamber of Commerce. He is the immediate Past-President of the Western Section of the Institute of Transport; a Direcor of the Southern National Omnibus Co. Ltd.; the Western National Omnibus Co. Ltd.; and a member of the Plymouth Joint Transport Committee. He is a Gold Medallist for a Prize Essay submitted to the G.W.R. Debating & Lecture Society.

Scottish Region, British Railways, announces the following appointments:—

Mr. H. Cheetham, Assistant Stores Superintendent, Eastern and North Eastern Regions, as Supplies and Contracts Manager, Scottish Region.

Mr. A. E. Bainbrigge, Assistant Stores Superintendent, as Supplies Officer.

Mr. A. R. D. Roberts, Senior Quantity Surveyor, Chief Civil Engineer's Department, as Contracts Officer.

Mr. D. L. Pride, District Operating Superintendent, Birmingham, Snow Hill, Western Region, British Railways, who, as recorded in our January 2 issue, has been appointed District Traffic Superintendent, Birmingham, joined the former Midland Railway in 1915. After experience at stations, in control rooms, at Derby headquarters, and on the relief staff, he was appointed a district inspector, London Midland & Scottish Railway, in 1930. In 1936 he was transferred to Birmingham (Western Division), L.M.S.R., as a passenger train inspector. He moved to Bletchley, as Assistant District Controller, in 1941, returning to Birmingham L.M.S.R. (Western Division) in 1944 as Assistant to the District Operating Manager. He was subsequently appointed Assistant District Operating Manager, Birmingham. In January, 1948, he was transferred to Nottingham Midland, as Assistant District Operating Superintendent. He returned to Birmingham, in November of that year, as District Operating Superintendent, London Midland Region (Western Division). Mr. Pride was appointed District Operating Superintendent, Birmingham, Snow Hill, Western Region, in January 1951, the position he now relinquishes.

Mr. D. G. Haigh has been appointed Export Manager, Chloride Batteries Limited. He was formerly a co-ordinator on overseas business and contracts for Chloride Electrical Storage Co. Ltd.

Sir William Scott, Managing Director of Armstrong Whitworth (Metal Industries) Limited and Sir Richard Bellingham Graham, have been appointed Directors of Head Wrightson (Teesdale) Limited, a subsidiary Company of Head Wrightson & Co. Ltd.

Ing. Emil Schubiger has been nominated, by the Swiss Association of Consulting Engineers, as Hon. Treasurer (Designate) of the International Federation of Consulting Engineers (F.I.D.I.C.), in succession to the late Mr. Robert Naef. He will act as Hon. Treasurer until he takes office at the Annual General Assembly of F.I.D.I.C., at the Hague in May.

Mr. J. E. Belanger

Appointed Chief of Investigation Department, Canadian Pacific Railway

Mr. G. F. Walsh

Appointed System Supervisor of Employment, Canadian Pacific Railway

Mr. T. W. Baird

Appointed Supervisor of Employment, Montreal, Canadian Pacific Railway

Mr. J. E. Belanger, Deputy Chief of Investigation Department, Canadian Pacific Railway, who, as recorded in our January 2 issue, has been appointed Chief of the Investigation Department, was educated at Montcalm School, Montreal. Mr. Belanger joined the Canadian Pacific Railway as a constable at Quebec City, in 1923. He was appointed Investigator at Montreal, in 1927, and Inspector in charge of the Quebec District in 1944. He was promoted to be Assistant Chief, of the railway's Investigation Department, in 1952, and Deputy Chief in 1954. He won recognition for his investigation of the Quebec Airways plane, blown up in 1949. Mr. Belanger is Past-President of the Province of Quebec Police & Fire Chiefs' Association, a member of the Canadian Association of Chiefs of Police, and of the International Association of Chiefs of Police.

Mr. E. Chatterton has relinquished his position as Chief Engineer of the Piston Engine Division, D. Napier & Son Limited.

The Hon. J. Kenneth Weir, Chairman of G. & J. Weir Holdings Limited and G. & J. Weir, Limited of Glasgow, has been elected a director of the International Nickel Co. of Canada Ltd.

Mr. D. C. Lorkin, Joint Managing Director with Mr. S. F. Steward, of Lancashire Dynamo Holdings Limited has been appointed Managing Director of the company. Mr. Steward has resigned on his appointment as Director-Designate of the British Electrical & Allied Manufacturers' Association.

Mr. R. E. Wilson, Managing Director of Fescol Limited, has retired, and the following appointments have been made: Mr. F. B. Strachn, Assistant Managing Director, becomes Managing Director; Mr. F. Baden, Works Manager, Port of Glasgow Factory, becomes Works Manager, London; Mr. C. W. Hay, Works Manager, Huddersfield, becomes Works Manager, Port of Glasgow Factory, and Mr. A. E. Lockley, Assistant Works Manager, Huddersfield, becomes Works Manager, Huddersfield.

Mr. G. F. Walsh, Supervisor of Employment, Montreal, Canadian Pacific Railway, who, as recorded in our January 2 issue, has been appointed System Supervisor of Employment, will act in a co-ordinating capacity to unify employment standards and techniques throughout the system. Mr. Walsh joined Canadian Pacific Railway, in 1924, as a junior clerk in the Montreal City Ticket Office. He served with Right-of-Way, Tax and Transportation Departments and in the Statistical Bureau and Office of the Convention Traffic Manager, in Montreal. During the 1939-45 war, Mr. Walsh was seconded to the Wartime Prices & Trade Board, where he served as Asssistant Chief of Personnel, and later to the War Assets Corporation, as Manager of Administrative Services and Assistant Director of Organisation & Personnel. He rejoined Canadian Pacific Railway in 1948, as Supervisor of Employment at Montreal, the position he now relinquishes.

Sir John Elliot, Mr. F. D. M. Harding, O.B.E., and Mr. E. J. Morris have been elected directors of the Pullman Car Co. Ltd.

Mr. E. N. Wenborn, Joint Managing Director of the Woodall-Duckham Construction Co. Ltd., has been appointed a director of Woodall-Duckham, Limited, the parent company of the Woodall-Duckham Group.

Mr. G. F. Wix has now resigned from the board of the Phosphor Bronze Company, a member of the Birfield Group, and has joined Bernard Collins Limited, as Sales Director. Bernard Collins Limited is a wholly owned subsidiary of Coates & Applyby Limited, the Chairman of which is Mr. Ranald J. Harvey.

Mr. W. H. Glass, a director of Thermotank Limited for 25 years, has retired from the board. Mr. Glass joined the company in 1916. He received his early training with the Caledonian and the North British Railways and with the North British Locomotive Co. Ltd. The services of Mr. Glass will be available to the company in a consultant capacity.

Mr. T. W. Baird, Assistant Supervisor of Employment, Montreal, Canadian Pacific Railway, who, as recorded in our January 2 issue, has been appointed Supervisor of Employment, Montreal, served with the United States Marine Corps in the U.S.A., China and the Philippines from 1923 until 1928, and later commanded the Winnipeg Sea Cadets for many years. Mr. Baird joined the Staff Records Department, Canadian Pacific Railway at Winnipeg, in 1939. After war service with the Royal Canadian Navy, he rejoined the Staff Record Department, in 1945, as Employment Clerk and was transferred to Montreal, in 1956, as Assistant Supervisor of Employment. Long associated with naval affairs, he is a member of the National Council of the Navy League of Canada.

Mr. J. W. Potter has been appointed Secretary of Metropolitan-Vickers Electrical Co. Ltd. He succeeds Mr. D. Thomson, who has retired.

Mr. H. West has been appointed assistant Managing Director of the Metropolitan-Vickers Electrical Co. Ltd. He has ceased to act as Director of Electrical Engineering.

Mr. W. F. Cartwright, Assistant Managing Director, Steel Company of Wales Limited, has been appointed a director of Davy & United Engineering Co. Ltd.

Mr. A. McVie, General Commercial Manager, Standard Telephones & Cables Limited, has been appointed General Manager (Overseas): Mr. A. G. Slemeck, Commercial Manager (Export), becomes General Commercial Manager.

Mr. F. W. Gardner, Deputy Chairman of C. A. Parsons & Co. Ltd., has been appointed Chairman. He succeeds the late Sir Claude Gibb. Mr. H. H. Mullens, Chairman & Managing Director of A Reyrolle & Co. Ltd., and a member of the Parsons board, has been appointed Deputy Chairman. Mr. G. M. Baker, a Director & General Manager of C. A. Parsons & Co. Ltd., has been appointed Managing Director.

NEW EQUIPMENT AND PROCESSES

Gas Point Heater

A PROPANE gas point heater, of the type in general use by French Railways, is undergoing tests by the Chief Civil Engineer of the North Eastern Region of British Railways. The equipment has been installed experimentally at No. 524 points at the north end of platform No. 9 at York Station.

Gas is fed at low pressure (1 lb. per sq. in.) by rubber (reinforced) hose from propane gas cylinders which are stood on the permanent way. The gas cylinders are the standard type used in British Railways restaurant cars. On this particular "C" type switch, there are three burners to each stock rail, although additional burners could be used if a longer length of stock rail required to be heated. The burners are housed in light galvanised sheet steel casing held to the outside of the stock rail by spring steel wire clips. These in turn are secured to the sleepers by short lengths of light steel channel. The flame from the burners is directed horizontally and parallel to the stock rails.

On receipt of a frost warning, the jets are lit by hand. Two cylinders of gas are sufficient for approximately 48-hr. of continuous burning. In the wintry conditions experienced during January, the experimental heater has given satisfactory results, although conditions have not been sufficiently severe to enable results to be regarded as conclusive.

The heater is manufactured by Antargaz, 28, Rue Bayard (8c), Paris, from which company further details may be obtained.

Air-Cooled Diesel Engines

A RANGE of British air-cooled multi-cylinder Vega diesel engines, of sufficient power for shunting locomotives, train-heating sets and so on, has been produced after extensive research and development work in this relatively new field.

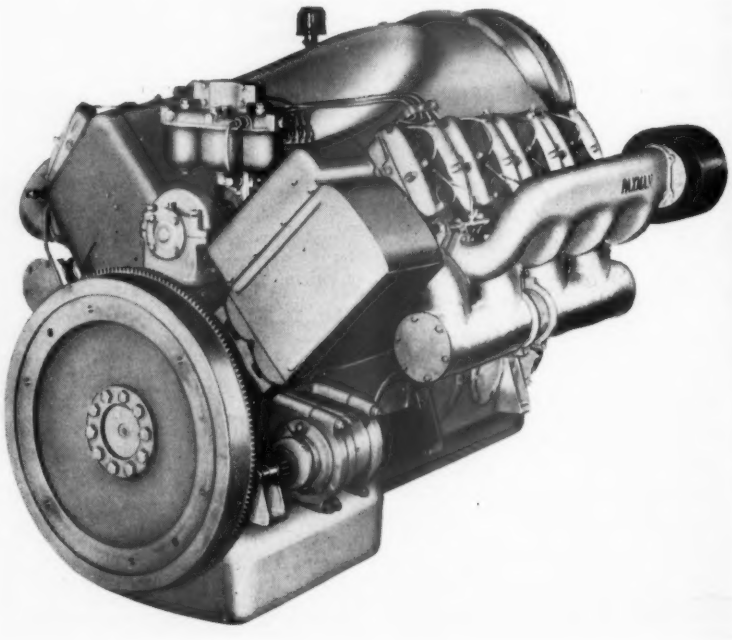
Largest in the Vega range is the 12YGA 444-b.h.p., 2,000 r.p.m., 12-cylinder unit which weighs 4,600 lb. complete. The manufacturer claims that throughout the world there is no air-cooled diesel of comparable power available on a commercial basis. This model, and the 8YGA 295-b.h.p., 8-cylinder version illustrated, have a 90-deg. vee-form, staggered cylinder arrangement and a bore and stroke of 6 in. × 6·6 in. There also is a six-cylinder in-line model, the 6YGA, developing 222 b.p.h. at 2,000 r.p.m.

Aircraft-engine design and manufacturing techniques were studied before adopting the one-piece cylinder barrel and head of finned aluminium alloy with hardened and tempered shrunk-in cast-iron liner. Single inlet and exhaust valves are mounted at a slight inclination to each other in the open combustion chamber which has a wear-resisting exhaust seat insert. The injector is nearly central. Pistons have chromium-plated top rings. The compression ratio is 15:1.

The oil cooler is in a separate low-pressure circuit. It has a ducted air supply as for individual cylinder shrouds. Located between the cylinder banks, the axial-flow fan is driven by an enclosed triple-roller chain. The camshaft is gear-driven and a hydraulic governor is housed in the C.A.V. block-type fuel pump. Electric starting is standard equipment.

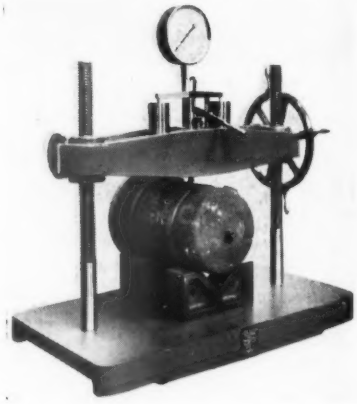
Installation is simplified as the basic engine forms a complete power unit, needing no water or lubricating-oil plumbing, and it is stated to be equally suitable for tropical or arctic temperature conditions.

Delivery of production orders will begin early in 1960. Further details and prices may be obtained from the manufacturer, Davey, Paxman & Co. Ltd., Colchester.



Hardness Testing Machine

A NEW Brinell hardness testing machine is available for use on large components.



The hand-operated head comprises an 8-in. dia. 0-3,000 kg. pressure gauge, checkweights, hand-operated pump and 10 mm. dia. ball support assembly fitted into a substantial crosshead. This is supported on two screws located in the cast-

iron base and is adjustable to any vertical position by a handwheel.

With a table measuring 44 in. × 24 in., this machine has a 30 in. clearance between screws and is adjustable to a maximum height of 24 in. between base and steel ball. These sizes can be varied to suit individual requirement.

The machine is one of a range built under licence from the Tinius Olsen Testing Machine Company, Philadelphia, U.S.A., by Edward G. Herbert Limited, Atlas Works, Levenshulme, Manchester 19, from which company further details can be obtained.

Side-Loading Fork-Lift

A SIDE-LOADING fork-lift truck with hydraulic operation is available which should be suitable for transport use. The manufacturer claims that the high initial cost is offset by economies resulting from its speed of operation—loading and unloading time is 10 to 15 sec.

Models available are three, four, and five tons. Travelling speed ranges from 3 to 27 m.p.h. (5 m.p.h. in reverse). Lifting speed for the three- and four-ton models is 65 ft. per min. (48 ft. per min. for the five-ton model). Lifting capacity is 6,720 lb., 8,960 lb., and 10,000 lb. respectively. Maximum speed of traverse is adjustable from two to 10 sec.

Centre of load is carried between the axles, ensuring even distribution of weight. No counterbalance is incorporated—instead, large-diameter single-acting lift stabilisers gaitered with leather and incorporating ball joints combine with the load-centring factor to ensure equilibrium. The loader can work on unsurfaced roads without making ruts or tracks. It does not manœuvre to load and consequently there are not enough sharp turning wheels to rough up the surface. This can even apply to tarmac on a hot day.

Mast wear is minimised through all-roller construction by which the inner section rolls up and down the outer section. The mast is mounted on sealed ball bearings throughout.

A new method of traverse combats "walk-out" and slewing. The mast is traversed by two heavy duty 1-in. pitch simplex chains with a combined strength of over 10 tons. A double-acting hydraulic cylinder rotates the traversing shaft which is geared to the chains. The amount of hydraulic fluid fed into this cylinder can be controlled by the flow regulating valve. Adjustment of this controls maximum traversing speed. The cylinder includes a hydraulic cushion which slows down the rate of mast travel as it reaches the limits of its journey, even if an inexperienced operator is holding the lever wide open.

Good after sales service is provided—all spare parts are stocked, and service vans and engineers are available on demand or on a contract basis.

Price is £1,000 per ton-weight lift. Delivery is normally four months but can be sooner if specially required.

Further details can be obtained from the manufacturer, Lancers Machinery Limited, 41, Knightsbridge, London, S.W.1.

Ball Bushings

BALL bushings, already in use in the United States, now are being manufactured in Britain for distribution in the U.K. and Commonwealth except Canada.

Ball bushings contain three or more ball circuits round which the balls rotate as in a conventional ball-bearing. While load is carried in one part of the cricuit, unloaded balls continuously recirculate back to the starting point in a retainer. Each ball bushing forms a compact assembly which can be handled as a unit.

It is claimed that these bushings reduce starting loads, provide limitless length of stroke, and permit higher speeds than those attainable through the use of plain bearings. A low co-efficient of friction is minimally affected by changes in load or lubricant viscosity. Other advantages claimed include freedom from binding and chatter, precision in linear motion, easy handling, reduced weight, low cost, and long life.

Eleven shaft sizes are supplied, ranging from ¼ in. to 4 in., with corresponding outside diameters from ½ in. to 6 in.

Further details can be obtained from the manufacturer, Ransome & Marles Bearing Co., Ltd., Newark-on-Trent.

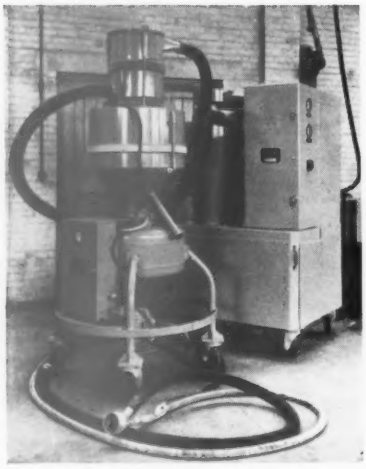
Radiography

A NEW range of isotope containers for Gamma radiography is available (patents pending). They have a good protection : weight ratio, are simple to operate, and tolerant of bad conditions.

The use of radiography for non-destructive inspection of important welded joints is widespread in many industries. It is claimed that the method improves the quality of welding, is a simple and reliable way of making spot checks, and is of special use in the inspection of welded repairs.

The standard container weighs about 30 lb. and is suitable for iridium 192 (radiography of steel ½ in. to 2½ in. thick) or caesium 137 (for steel 1 in. to 4 in. thick). When loaded with 2½ curies of iridium 192, the containers can be said to be "safe" at surface. The illustration shows a small version for thulium 170, which is suitable for thin sections of steel or light alloys. This container weighs 8½ lb.

Further details can be obtained from the manufacturer, R. F. Fraser-Smith, 69, Kings Cross Road, London, W.C.1.



Pressure-Vacuum Cleaning

DEVELOPMENT of existing designs has resulted in machinery which will blast-clean work of complex surface and difficulty of access where it is required to combine the unrestricted movement of the open-blast nozzle with dust recovery.

The open Vacu-Blast method uses a modified type of gun-head which is held 3 to 4 in. from the work surface. Although free movement thereby is obtained, dust is drawn off and retained in the closed system of the machine.

The Major Mark II machine is a version of the existing Major 130 NC equipment. It gives sufficient capacity for approximately 30 min. open vacu-blasting. The machine has been designed as an all-weather model for outdoor work. It also may be used indoors.

Attachments can be obtained for cleaning tube bores of any size from $\frac{1}{8}$ in. upward.

Besides its use on ferrous metals, the machine is claimed to be successful on aluminium alloys, nimonic alloys, yellow-metal alloys, Durestos material, resin-bonded lamina, and practically any thermo-setting plastic.

Further details can be obtained from the manufacturer, Vacu-Blast Limited, Bath Road, Slough, Bucks.

Spray Gun Development

TWO new nozzles have been introduced for use with the Bullows L200 Model 2 spray gun. These nozzles, the A8P and A9P, are for low-pressure spraying.

Recent tests carried out have included spraying railway wagons in an open shop. In this test, it is claimed that the A9P applied a full coat of grey primer at a speed approaching 140 sq. ft. in $1\frac{1}{2}$ min. This time included re-positioning of trestles.

In a further test, a stoving synthetic at 30 seconds viscosity was applied to approximately 120 sq. ft. inside a van body. Time taken is claimed to have been three minutes. It further is claimed that very little overspray resulted from both these tests.

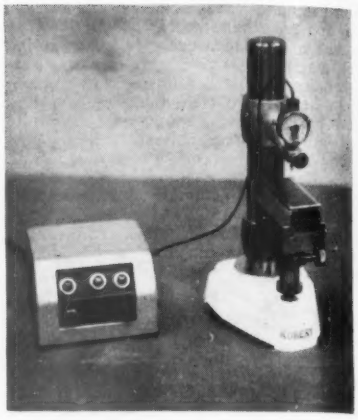
The A8P nozzle also has been used in conjunction with a red oxide primer with pressures reduced to 7 lb. per sq. in. on the pressure container and an atomising pressure of 30 lb. per sq. in.

Each nozzle costs 15s. plus 20 per cent.

Further details can be obtained from Alfred Bullows & Sons Ltd., Long Street, Walsall, Staffs.

Electro-mechanical Comparator

AN electro-mechanical comparator is available which, in addition to gauging up to 20 dimensions simultaneously, shows the amount of error outside tolerance on each dimension.



The equipment consists of dial gauge, indicator box, and stand. The gauge, made by Junghans, can be supplied with 0·0001-in. or 0·0005-in. scale divisions. Tolerance for electrical indication is adjusted by two lateral screws the setting of which operates the green light for "go," red light for "plus," and amber light for "minus." The amount of error can be read on the dial gauge, which also can be used for mechanical reading only.

Special fixtures for measuring up to 20 dimensions simultaneously and angle connectors at 30, 45, 60 and 90 deg. can be supplied.

Further details can be obtained from the manufacturer, Rubert & Co. Ltd., Demmings Road, Cheadle, Cheshire.

Flashbutt Welding Machine

A HEAVY-DUTY flashbutt welding machine is available having a maximum welding capacity of 12 sq. in. (sectional area) in mild steel. The machine can weld tubes up to $6\frac{1}{2}$ in. dia. A fettling unit can be fitted to remove internal weld upset when welding short tubes to longer lengths.

One fixed and one sliding clamping unit is used. This is operated from a two-stage air/oil intensifier system from 80/100 lb. per sq. in. air supply. Initial low pressure, direct from an air cylinder, applies a one-ton load which is intensified to 27 tons for final clamping.

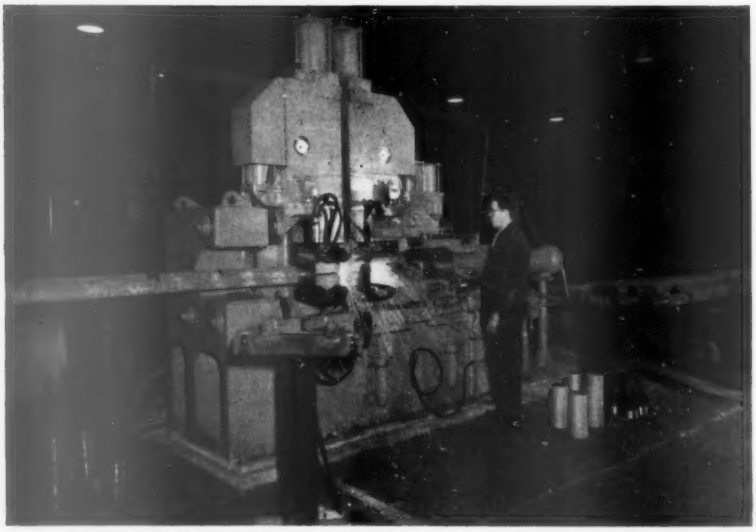
A wide variation in size and shape of workpiece is possible. Vertical and horizontal adjustment permits accurate alignment.

The forging unit applies an 18-ton pressure. Pre-heating can be accomplished manually or automatically. A 350 kVA. water-cooled single-phase transformer is mounted separately to give easy access for maintenance and adjustment. Air and water demands are 20 cu. ft. of air at 80/100 lb. per sq. in. per weld and 240 gal. per hr. respectively.

Further details can be obtained from the manufacturer, A.I. Electric Welding Machines Limited, 68, Victoria Street, London, S.W.1.

Toroidal Voltage Regulator

We regret that we omitted to include the name of the manufacturer of the new toroidal voltage regulators described in this section in our January 30, 1959 issue. This is Foster Transformers Limited, South Wimbledon, London, S.W.19.



B.T.C. Passenger Charges Scheme

Loss of goodwill through fare increases: early morning fares

The hearing by the Transport Tribunal, in London, of the British Transport Commission Passenger Charges Scheme was resumed on February 3. A summary of the preliminary hearing, held in December, 1958, was published in our issue of January 2.

Sir Reginald Wilson, Member of the British Transport Commission, stated on February 3, in reply to Mr. E. Milner Holland, Q.C., for the London County Council, that it was not true that the sole object of the application was to enable the Commission to raise fares. The aim was flexibility in fixing charges.

Asked how much additional revenue it was proposed to obtain from London passengers he said that the B.T.C. was asking the Tribunal for authority to obtain £10,500,000. That was a maximum sum which might not be fully required. In that event it would not be raised.

Retention of Public Goodwill

The contribution by London passengers of £40 million to central charges, Sir Reginald Wilson added, was small compared with an annual turnover of £100 million a year for London Transport.

He agreed it was important that the Commission should retain the goodwill of the public. When he stated that peak travel did not pay, he was asked if this was the reason for the proposed increased charges to season ticket holders.

The main reason for this increase, he explained, was that long-distance season ticket-holders were travelling at ½d. a mile, which was exceedingly cheap.

He denied that the season ticket holder was being deliberately driven away. Such people, he said, were an insurance against competition from private cars. But the insurance premium might be too heavy for the Commission to pay.

The B.T.C. did not wish to abolish early morning tickets altogether, but to rid itself of the statutory requirement to issue them. It wanted to be able to exercise its commercial judgment.

When the hearing was resumed on February 4, Sir Reginald Wilson, asked about the loss of goodwill caused by increasing fares, replied: " If you go along in deficit year after year as London Transport has been forced to do, how can you expect the respect of the public of this country? It is essential, from the point of view of public relations, that we get out of this miserable situation we have been in for far too long, in which we have these yearly deficits."

Mr. Geoffrey Ripon, representing several municipal councils in the Home Counties, asked whether the loss of goodwill caused by raising fares was temporary or permanent.

Sir Reginald Wilson replied that if the B.T.C. were given some sort of reserve, this would not have to go on year after year. Three-yearly intervals would be a very great help to our public relations. At present, each time there was an inquiry, public relations were worsened five times over. " No reserve means certain economies," he added, " and of course, no Victoria Tube. That is the consequence of not facing facts when they have to be faced."

He agreed that between 1948 and 1957, L.T.E. had lost over 1,000,000 passengers a day, but pointed out that there were still 15,000,000 passenger journeys daily in London. He considered a further loss likely as a result of implementing this scheme.

Early Morning Fares

Questioned as to the proposed abolition of early morning fares, Sir Reginald Wilson said that the Commission could imagine certain circumstances where it might be proper to have a fare in the early part of the day lower than the fare at the height of the peak. The Commission was seeking to end the statutory obligation to provide a cheap early morning fare. It was probable that, for commercial reasons, some cheap fare would be offered in the early morning.

During the hearing on February 5, Mr. W. I. Winchester, Director of Budgets, B.T.C., said the only substantial savings which could be made by L.T.E. quickly, would be from a reduction of services. The opportunities for savings by London Transport through modernisation were extremely limited.

Mr. B. H. Harbour, member of London Transport Executive, cross-examined by Mr. E. Milner Holland, said it was the intention of L.T.E. eventually to end early morning fares, which it considered an anachronism. He saw no purpose in a cheap fare for people who had to travel at a particular time. He doubted whether such a fare would attract people away from the peak hours. Prices in urban travel to and from work were not significant in determining the time travel took place. It was determined by the time work started and finished. It was thought that fares should not be fixed in relation to capacity of earnings. Fares should be based on the cost of the ride. Whether certain classes of people should be assisted in their journeys was a welfare matter. There might have been, many years past, a case that people who travelled to work before 7.30 or 8 a.m. were in a low earning group. He did not think it applied today.

Mr. Harbour agreed that the Commission was budgeting for a loss of 15 per cent on British Railways London lines, 10 per cent on London Transport railways, and 5 per cent on buses when early morning fares were removed.

Continuing his evidence, on February 6, Mr. Harbour said that, as proposed by the Commission, a weekly season ticket would not be cheaper than paying ordinary fares over a five-day week, unless the journey were more than 11 miles.

Answering Mr. Holland, he agreed that the Commission's tables were based on the assumption that early morning travellers would not buy monthly season tickets because they were working class people on a week-by-week budget.

Competition with L.T.E. Services

He was apprehensive about the future of L.T.E. traffic, because of severe competition from private transport. The sale of small cars and motor-scooters was rising. He admitted that the tendency had been noted when he had budgeted for 1958, but at that time he made no allowance whatsoever for the lessening of restrictions on hire purchase and other means of credit with which they now had to deal.

In answer to Mr. A. E. Telling, for the London Passengers Association, who raised the question of sit-down strikes on the Underground, Mr. Harbour did not agree that there was a certain growth of public resentment against L.T.E. The people involved in these strikes had " become awkward; and the Londoner and the Britisher can become awkward." The strikes were not symptomatic of general resentment.

During the hearing on February 9, Mr. P. G. James, Chief Financial Officer, L.T.E., said that the capital expenditure of London Transport in the four years 1958-61 would exceed £39,000,000. It would cover replacements and modernisation of railway rolling stock, trolleybus conversion, power supply modernisation, work on the Metropolitan Line and electrification between Rickmansworth and Amersham.

Staff and Labour Matters

Railway Pay Inquiry

A meeting took place on February 9 between the Railway Pay Committee of Inquiry, under the chairmanship of Mr. C. W. Guillebaud, and the Railway Pay Joint Advisory Committee, which is the joint body consisting of representatives of the B.T.C. and of the three railway trade unions, responsible for advising the Committee of Inquiry on investigations in connection with railway pay.

The Committee of Inquiry is understood to have reported on the progress made in connection with the appointment of investigators from outside the railway service. The latter are to undertake inquiries into the relativity of the pay of railway salaried and conciliation staff with the pay of staff in other nationalised industries, public services, and certain private undertakings.

They are expected to begin their enquiries in the near future. As a first stage they will concentrate on the duties of clerical staff. Those of other grades will be examined later. Separate conclusions will not be published until the investigations into the whole of the railway salaried and wages grades concerned have been completed.

Special Rates for Traffic via South Wales Ports

As a result of a meeting with Sir Brian Robertson, Chairman, British Transport Commission, and after discussions since held between British Railways, British Transport Docks, and the Technical Panel of the General Cargo Sub-Committee of the Industrial Association of Wales & Monmouthshire, new rates are announced for traffic via ports in South Wales.

In continuation of the Commission policy to assist in the development of trade through the South Wales ports, it has been decided that as from May 1 British Railways will introduce a system of new rates for merchandise, with certain exceptions mentioned below, through the ports of Newport, Cardiff, Barry, Swansea and Port Talbot, inclusive of rail conveyance within the Docks, and loading into wagon of imports and unloading from wagon of exports. Transit shed services, shipping from quay to vessel or receiving from vessel to quay, will con-

tinue to be excluded from the railway rate.

In the case of timber, liquids in bulk, solids in bulk, loose traffic such as bricks and slates, returned bogies, and meat, rates are to be introduced which will include rail conveyance within the docks.

Wholly excluded from these arrangements are:—(1) consignments of less than 2 tons, (2) coal, coke, and patent fuel, (3) livestock, (4) rail vehicles on their own wheels, and (5) traffic of all descriptions consigned to or originating in the area south and west of a line drawn from Severn Tunnel Junction to Abergavenny thence to Carmarthen and thence along the railway line to Lampeter and Aberayron.

British Railways also will be prepared to quote rates inclusive of dock haulage and tolls for rail conveyance within Port Talbot and Swansea Docks for import and export traffics including those destined to or emanating from the area defined in (5) above, other than for those traffics wholly excluded from the arrangements.

There is much preliminary work to be done and further information will be published as soon as possible.

Duke of Edinburgh Visits Integral Coach Factory, Madras

The Duke of Edinburgh visited the Integral Coach Factory at Perambur, Madras, on January 31. He was accompanied by Mr. C. Subramanian, Finance Minister of the State of Madras.

On arrival, he was received by Mr. K. Swarup, Chief Mechanical Engineer of the Factory. He was shown the shops, workers' canteen, and the technical training school attached to the factory. He inspected different stages of assembly, and a fully finished coach. At the factory colony, he was welcomed by workers' children and inspected one of the housing units.

At the conclusion of his visit, His Royal Highness was presented with a casket made of gold, silver, and wood, with a silver model of the coach that is being produced in the factory, on the top.

Mr. Swarup, presenting the casket, conveyed the greetings of the Railway Minister, and of the Chairman and Members of the Railway Board to the Duke, and also the greetings of the Indian railwaymen and the coach factory workers to the British railwaymen and the various British industries which had extended help to the Integral Coach Factory.

The Duke of Edinburgh thanking Mr. Swarup for the souvenir, said that there was no doubt that Indian workmen would gradually in the course of a generation develop to be as good as their counterparts in other parts of the world and that he was very much impressed with what he saw.

Parliamentary Notes

Lords Debate on B.T.C. Borrowing Powers

The Earl of Gosford, Lord in Waiting, moved the second reading of the Transport (Borrowing Powers) Bill in the House of Lords on February 3.

He said that the progress of the investment in modernisation had been rapid and out of the B.T.C. power to borrow £600 million, some £511 million had already been exercised by the end of December. What was proposed was a second instalment of the power to borrow, chiefly to cover modernisation. In taking the decision to extend the borrowing powers, the Government was in no way introducing a policy of subsidising the railways.

Economies in staff, he added, were being achieved through consultations with the unions. A reduction in the labour force of 20,000 was achieved in 1958-59. Natural wastage could not always fall together with the same grades to be reduced, but the Commission had done its best to lessen the hardship whereever possible.

Lord Silkin said the Bill was non-controversial. The Opposition was in entire agreement with its proposals. Arguing that the Government was not granting enough money for modernisation, Lord Silkin said that in the light of the facts he had given about Government intervention and the Minister's interference in preventing the B.T.C. from carrying out its task, it was unfair for the Minister to be constantly nagging the Commission. The whole tone of the Minister's letter to the Commission on October 30 was that of a father admonishing a son for extravagance. The Government was justified in suggesting any fault on the part of the Commission when the Government itself, by its own policy, was largely responsible for the present position.

When the Labour Government decided to nationalise transport it included road transport, because it regarded the general transport of passengers and goods as a comprehensive national service. There was a considerable difference in the approach to the functions of the railways between the Government and Opposition. Did the Government regard the railways as a public service to be maintained or supported regardless whether they could be made to pay? The Government seemed to blow hot and cold.

The present position had not come about because of nationalisation. Had the railways remained in private hands the Government would have been compelled to regard them as a national service and to have found money for modernisation.

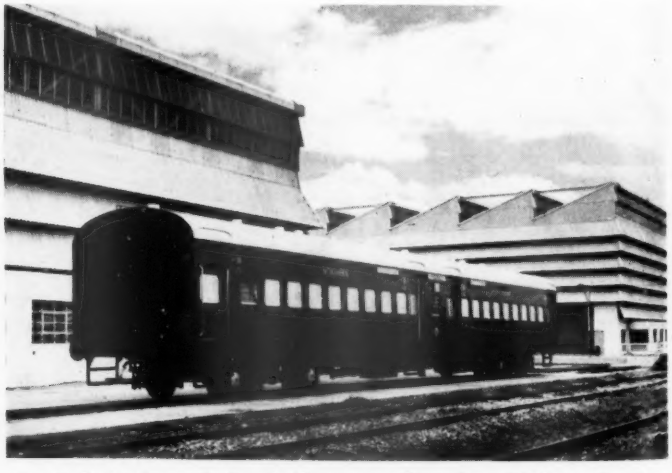
Lord Silkin spoke of the need for secretarial and telephone services in British Railways trains, for example passenger accomodation, more varied times for meals and more varied menus in refreshment cars, and for greater punctuality. The upper berths in second class sleeping cars should be abolished. He understood that half of the trains arrived late and asked why this should be so in normal weather. He believed that in Italy it was an offence for a train to be late.

Lord Rathcavan said that the principal reason given for the railways difficulties last year was that the coal traffic was much less than had been expected. There was no reason to suppose that there would be any more coal offered for carrying in 1959 than in 1958.

When the last railway wage increases were granted it had been said that they were granted on the understanding that economies would be made. A few months later the Government was going to allow the railways to increase their deficiency to allow them to pay the wage increase. The modernisation plans were not going to bring the railways out of their financial difficulties.

Viscount Stonehaven said that there were signs, in the way the railways were tackling their job, of a different outlook; he would like to gamble on the success of the B.T.C. . . . The railways, he added, despite all this on their plate, were flexible in their

The Duke of Edinburgh at the Integral Coach Factory with (left) Mr. C. Subramanian and Mr. K. Swarup



Part of the Integral Coach Factory at Perambur, Madras, showing 5-ft. 6-in. gauge third class coach of new standard design, completed for the Northern Railway

outlook. Suggestions put to them were considered. Two clerks at Stonehaven station had suggested stabling a diesel train at the station, which would mean a late night and an early morning train service to Aberdeen, bringing in £3,000 a year in season tickets.

Swansea & Mumbles Railway

Lord Merthyr, as Chairman of Committees of the House of Lords, moved on February 5 that the South Wales Transport Bill be read a second time.

Lord Merrivale said he considered it to be a most regrettable trend that in every year these Private Bills came before the House with a view to obtaining powers to do away with electric traction. The arguments put forward in this case were similar to those put forward in previous Private Bills. In the case of the Swansea & Mumbles Railway they read as follow:—

". . . the requirements for passenger transport within the area at present served by the Oystermouth Railway and the Mumbles Railway would be met more efficiently and economically by services of public service vehicles co-ordinated with other services of the Transport Company."

Lord Merthyr said that it was not normally the practice for the Chairman of Committees, when moving the Second Reading of a Private Bill, to make a speech upon it. In effect, this Bill closed a short length of railway from Swansea to the Mumbles. The long title of the Bill stated that it was "An Act to provide for the closing of the Oystermouth Railway and the Mumbles Railway, the dissolution of the Swansea & Mumbles Railways, Ltd., and the Mumbles Railway & Pier Company. . ." It repealed a Private Act passed in 1804, "for making and maintaining a railway or tramroad from the town of Swansea into the Parish of Oystermouth in the County of Glamorgan." No petitions had been so far put against the Bill, but there were still another 24 hr. in which that could be done.

The Second Reading of the Bill, was postponed until February 17.

When the time limit for petitions against the Bill expired on February 6, five petitioners had notified their intention to object in committee.

Questions in Parliament

Statutory Obligations of British Railways

Mr. Ernest Davies (Enfield E.—Lab.) asked the Minister of Transport & Civil Aviation on February 5 if he would take steps to clarify the law which constituted British Railways as common carriers in view of the uncertainty that at present existed.

Mr. Harold Watkinson, in a written answer: I am not clear what uncertainty the hon. Member has in mind. I am advised that, in relation to passengers and certain classes of goods, the railways are common carriers at common law, in the same way as other carriers, to the extent that they hold themselves out to all who desire to employ their services, as willing to carry for reward those passengers and goods. If he has in mind the statutory obligations placed upon the railways by Section 2 of the Railway & Canal Traffic Act, 1854, the provision under this Section prohibiting undue preference has been repealed, but the obligation to afford "reasonable facilities" still remains. The Commission has asked me to consider whether this provision might not also be repealed.

Contracts and Tenders

Metre-gauge track construction in French Equatorial Africa

A contract to the value of £9,500,000 has been awarded jointly to Taylor Woodrow (Overseas) Limited; the Compagnie Industrielle de Travaux, France; and the Utah Construction Company, U.S.A., for construction of a 200-mile single-line metre-gauge railway in French Equatorial Africa. The contract has been placed by the Compagnie Miniere de L'Ogooue, which is developing extensive manganese deposits near Franceville. The line will run from Mayoko to a point near Brazzaville, where it will connect with the Congo-Ocean Railway to give access to the port of Pointe Noire.

The London Transport Executive has placed orders to the value of some £3,500,000 for the traction motors and other mechanical and electrical equipment for the Central Line train renewal programme. At a later stage, after trials of the 12 prototype motorcars ordered recently from Cravens, Limited of Sheffield, it is intended to order some 330 new cars for the Central Line. These cars will be fitted with the equipment now ordered.

The principal contractors for equipment for the Central Line trains are as follow:—

British Thomson-Houston Co. Ltd.: traction control and auxiliary equipment

General Electric Co. Ltd.: traction motors

Westinghouse Brake & Signal Co. Ltd.: brake equipment and compressors

G. D. Peters & Co. Ltd.: door equipment

A.E.C. Limited: automatic couplers and disconnecting units

Patent Lighting Co. Ltd.: auxiliary electrical equipment

Benjamin Electric Limited: lighting and auxiliary equipment.

In addition to the above, a contract to the value of some £500,000 has been placed with Dialoy Limited for car doors for the new rolling stock for the Piccadilly, Metropolitan and Central Lines.

The Sudan Railways has placed an order with the English Electric Co. Ltd. for 15 1,875 b.h.p. main-line diesel-electric locomotives for general service on the 3-ft. 6-in. gauge system, including the haulage of heavy cotton crop from Khartoum and the interior to Port Sudan. The value of the order is some £1,500,000. The locomotives will have a Co-Co wheel arrangement and will weigh 99 tons in working order. They are designed for a maximum speed of 53 m.p.h. and dynamic braking is incorporated.

The British Transport Commission has placed orders for equipment for British Railways to the value of some £1,250,000. They include six two-tier motorcar transporter wagons, 99 sets of power and ancillary equipment including engines and transmissions for diesel train vehicles to be built in railway workshops, six experimental plastic containers for door-to-door conveyance of goods, and 240 other rail vehicles comprising vans, side-tipping ballast wagons, special vehicles for difficult loads, and two first class passenger coaches.

The details of the order are as follow:—

Newton, Chambers & Co. Ltd.: 6 two-tier motorcar transporter wagons

Standard Railway Wagon Co. Ltd.: 6 40-ton armour plate wagons and 2 20-ton WELTROL MC wagons

Metropolitan-Cammell Carriage & Wagon Co. Ltd.: 2 corridor first class coaches and 50 14-ton side-tipping ballast wagons

Mickleover Transport Limited: design, development and supply of six plastic containers

Pressed Steel Co. Ltd.: 180 bogie utility vans

British United Traction Limited: 30 230-h.p. twin-engined power car sets of units, and 30 sets of air-coupling equipment for non-driving trailer cars, to be built in British Railways workshops at Derby; 9 150-h.p. twin-engined power car sets of units, and 9 driving trailer car sets of equipment, for vehicles to be built in British Railways workshops at Derby; and 14 150-h.p. twin-engined power car sets of units, and 7 sets of equipment for non-driving trailer cars, to be built in British Railways workshops at Swindon.

The International General Electric Company, Erie, Pennsylvania, has received an order from the Tata Iron & Steel Company, Hindustan Steel (Private) Limited, and the India Iron & Steel Company for 75 diesel-electric industrial haulage locomotives, as part of their expansion programmes.

British Waterways has placed a contract with Sir Alfred McAlpine & Son Ltd., Wolverhampton, for the construction of engineering workshops at Bradley, near Tipton, Staffs., on the Birmingham Canal Navigations. The workshops will undertake the whole of the maintenance, repair, and construction work in the Midland District of British Waterways' South Western Division. They will replace the present isolated and obsolete Ocker Hill repair yard which, with certain short lengths of connecting canal, has been sold to the Tipton Corporation, who plan to re-develop the area.

The London Transport Executive has awarded a contract to George Cohen, Sons & Co. Ltd., for the disposal of some 1,400 trolleybuses. This is in conjunction with the L.T.E. plan for conversion to diesel buses.

Beckett, Laycock & Watkinson Limited has received an order for 3,953 Beclawat Tornado windows from the Union Carriage & Wagon Company of South Africa. These unit windows are required for 332 carriages for the South African Railways.

The British Transport Commission, South Wales Docks, has placed the following contracts:—

Charles Hill & Sons Ltd.: repairs to middle gates, South Lock, Newport Docks

The Fairfield Shipbuilding & Engineering Co. Ltd.: supply of steelwork for reconstruction of West Mendalgief Bridge, Newport Docks

Aberdare Cables Limited: supply of cable and link boxes for "A" and "B" Shed Wharves, Kings Dock, Swansea

British Railways, Eastern Region, has placed the following contracts:

W. & C. French Limited: repairs to

superstructures of underline bridge No. 56 over Sincil Dyke and underline bridge No. 58 over River Witham, between Branston and Saxilby

Keighley Lifts, Limited: supply, delivery and installation of one 20-cwt. and one 30-cwt. electrically operated goods lifts at Bishops Stortford Station

Holliday & Greenwood Limited: construction of new signalbox at Hackney Downs

The Cementation Co. Ltd.: provision of bored foundation piles for reconstruction of Jubilee Shed at Stratford Motive Power Depot.

British Railways, North Eastern Region, has placed the following contracts:—

Drummond-Asquith (Sales) Limited: axlebox washing machine, Simonside Wagon Depot

Conveyancer Fork Trucks Limited: one fork-lift truck, Darlington Stores

Paterson Hughes Engineering Co. Ltd.: one electrically operated slat conveyor, Hull English Street Goods Depot

S. Butler & Co. Ltd.: superstructure work, Ryhope, bridge No. 63A

H. Morris Limited: one 30-cwt. electric overhead travelling crane, Hull English Street Goods Depot

Consolidated Pneumatic Tool Co. Ltd.: 9 power vane impact wrenches

G. Greenwood & Sons: precast concrete units, Leeds (Wortley South) bridge No. 41

Precast Utilities (London) Limited: precast concrete framework for moulding shed, York Central Concrete Yard

Wakefield-Dick Industrial Oils Limited: oil fueling equipment, Leeds Neville Hill Motive Power Depot and York Clifton Sidings

C. G. Inkster: provision of bathrooms, Alnmouth Station Cottages.

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Portuguese East Africa:

Supply and installation of one turntable for 190 tons for reversing locomotives, including the calculation and execution of the respective foundations, in the marshalling yard in Lourenço Marques.

The issuing authority is the Ports, Railways & Transport Department, Lourenço Marques. A provisional deposit of Esc. 70,000 must be made by tenderers. The closing date is April 20, 1959. Local representation is essential. The Board of Trade reference is ESB/2908/59.

From India:

22 items of copper and steel plates for locomotives.

The issuing authority is the North Western Railway. The tender No. is 210-S/4-VI(PIL). Bids should be sent to the Chief Controller of Stores, North West Railway, Empress Road, Lahore. The closing date is February 16, 1959. Local representation is essential. The Board of Trade reference is ESB/3047/59.

From Iran:

415,000 timber sleepers

The issuing authority is the Iranian State Railways. Offers should be c. & f. Bandar Shahpoor or Iranian Julfa. Offers for delivery f.o.b. will not be considered. A deposit of 200 rials is required. The closing date is March 8, 1959. The Board of Trade reference is ESB/2609/59.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacon House, Theobalds Road, W.C.1).

Notes and News

Lower Shipping Rates for Motorcars to Ireland.—Reductions of nearly £5 are announced in return rates for motorcars by British Railways steamers to Ireland during May. Cars must be accompanied by two passengers travelling via Fishguard or Holyhead.

London Midland Region London - Nottingham Train Named "Robin Hood."—British Railways, London Midland Region, express train leaving Nottingham Midland Station at 8.15 a.m. and returning from St. Pancras at 4.45 p.m. has been named the "Robin Hood." The train arrives at St. Pancras at 10.25 a.m. and Nottingham Midland at 7.32 p.m.

Rise in Machine Tool Orders Not Maintained.—Figures published of home orders for machine tools placed in November, 1958 show that the slight improvement in October was not maintained. From £3,540,000 for October the value of home orders dropped to £3,180,000, which is £160,000 higher than the September figure. Export orders improved. From £1,480,000 for October the value rose to £2,460,000. In November the value of machine tools for the home market fell by £87,000, while that of export deliveries fell by £110,000.

Southern Area Board Visit to Lancing Carriage & Wagon Works.—The Southern Area Board, British Transport Commission, recently paid a visit to Lancing Carriage & Wagon Works, British Railways Southern Region. The accompanying illustration shows, left to right:—Messrs. D. F. C. Hill, Road Motor Engineer, F. J. Pepper, Carriage & Wagon Engineer, and C. P. Hopkins, General Manager, Southern Region; H. L. Roy Matthews, Member, Southern Area Board; W. J. A. Sykes, Chief Mechanical & Electrical Engineer, Southern Region; Sir Philip Warter, Chairman, Southern Area Board; Messrs. Kenneth Preston, A. B. B. Valentine, and J. MacNaughton Sidey, Members, Southern Area Board; and C. E. Collins, Works Manager, Lancing.

Closure of South Acton Branch of L.T.E. District Line.—For economy reasons the London Transport District Line branch between Acton Town and South Acton will be closed on February 28. Buses on route 55 provide a service between Acton Town Station and the South Acton area. Arrangements have been made to help those who travel on the branch with season tickets.

British Railways Information Bureau at Ideal Home Exhibition.—British Railways will have an information bureau at the Ideal Home Exhibition at Olympia, London, on March 3-30. Particulars of passenger and freight services will be available. Representatives of the Continental traffic departments will answer enquiries on travel to the Continent. The "Holiday Haunts" guides will be on sale.

Week-end Fares from N.E. Region to Scotland.—British Railways, North Eastern Region, is to offer week-end excursion fares between principal stations in the Newcastle-Sunderland-Durham area and certain destinations in Scotland, including Edinburgh, Dundee, and Perth, from March 6 until the end of the current year. First class weekend fares also will be available at about 50 per cent above the second class rates. Tickets will be available by any train after noon on Fridays or any train on Saturdays or Sundays. The return journey can be made on the Saturday, Sunday, or Monday of the same week-end.

L.T.E. Operating Department Reorganised.—Consequent on the retirement, recorded in our personal columns, of Mr. H. T. Hutchins, General Superintendent (Traffic, Railways), London Transport Executive has announced that the organisation of the Department of the Operating Manager (Railways) has been changed. The positions of General Superintendent (Traffic, Railways) and Central Superintendent (Staff & Training, Railways) have been abolished. A new appointment, Assistant Operating Manager (Railways), has been created, with responsibility to the Operating Manager, Railways, for traffic control, staff matters and timetables and duty sheets. The Divisional Superin-

Members of the Southern Area Board and Officers of the Southern Region on a visit to Lancing Works

tendents report to the Assistant operating Manager, Railways. The former Superintendents (Traffic) and (Staff) have been promoted to Principal Executive Assistants, reporting to the Assistant Operating Manager. A new position, Superintendent (New Works), of Principal Executive Assistant status, is to be created, about which a further announcement will be made later.

Information Controllers for London Underground.—London Transport Executive is to set up a team of information controllers at Leicester Square Station, the control centre of the Underground system. They will transmit details of breakdowns to station staffs, so that passengers can be informed. This decision follows several "sit-down strikes" by pasengers on Underground trains. Use is under consideration of tape-recording equipment in place of hand-written messages.

Institute of Locomotive Engineers Visit Morgan Crucible Co. Ltd.—On February 4, 53 members of the Institution of Locomotive Engineers were conducted on a tour of the carbon brush factory and engineering laboratory of the Morgan Crucible Co. Ltd., at Battersea, London. The Central Research Department of the Morgan Group also was inspected. The cutting, grinding, and shaping of brushes for railway traction motors and generators was seen, also the making of metal component parts and the flow assembly methods used. Investigation of many problems was shown in the laboratories, some under low-temperature, low-pressure conditions to test long-term brush and commutator wear-rates as in high altitude work. The accompanying illustration shows Mr. A. Feaver, of the Carbon Technical Department, explaining a production operation to Mr. R. Arbuthnott, President of the Institution, Mr. A. Campbell, Past President, and Dr. F. T. Barwell of the Electric Traction Research Department, British Railways Central Staff.

Inspection of carbon brush production during the Institute of Locomotive Engineers' visit to the Battersea Works of the Morgan Crucible Co. Ltd.

Fishguard & Rosslare Railways & Harbours Company Board Meeting.—Mr. K. W. C. Grand, General Manager, British Railways, Western Region, presided as Chairman of the Fishguard & Rosslare Railways & Harbours Company board meeting held at Paddington Station, Western Region, on February 3. At this meeting Dr. C. S. Andrews, Chairman of Coras Iompair Eireann, was elected Deputy Chairman of the Fishguard & Rosslare Railways & Harbours Company. The accompanying illustration shows (left to right) Mr. J. T. O'Farrell; Mr. T. C. Courtney; Dr. C. S. Andrews; Mr. K. W. C. Grand; Mr. A. H. Curtis Welch, Secretary; Mr. A. C. B. Pickford; and Mr. J. W. J. Webb.

Reconstruction of Birmingham New Street Station.—An exploratory meeting was held in October, 1957, between representatives of British Railways, London Midland Region, and a deputation from the Birmingham Corporation at which certain problems concerning the modernisation of New Street Station in relation to the development of the Inner Ring road scheme in the City were discussed. On February 6, 1959, a further exploratory meeting was held in Birmingham which was attended by the Chairman of the London Midland Area Board, Lord Rusholme, the General Manager, Mr. David Blee, and other officers of the Region and of the B.T.C., with representatives from the Birmingham Corporation. An exchange of information took place as to plans and progress of the modification of New Street Station and development of the Inner Ring road scheme. Plans are stated to be still not far enough forward for details to be published. It was agreed that further meetings should take place to ensure integration of the Corporation and B.T.C. development plan for the area.

Western Area Police First Aid Competition.—The Western Area Police First Aid Competition was held at Old Oak Common Hostel, British Railways, Western Region, on January 28. The maximum of marks was 400. Teams scored as follows: Exeter 333, Taunton 315, Cardiff General 289, Bristol 284, Swansea Docks 273, Cardiff Docks "B" 268, Cardiff Docks "A" 262, Paddington 261, Plymouth 258, and Wrexham 239. The adjudicators were Doctors J. C. Graham and D. Swan of London. Mr.

Board meeting of the Fishguard & Rosslare Railways & Harbours Company at Paddington

W. W. Wood, Chief of Police, Western Area, presided at the presentation of prizes at the termination of the contest. He was supported by Mr. A. C. West, Chief Constable, the adjudicators, Mr. W. G. Canning, Assistant to the Regional Establishment & Staff Officer, Mr. Brashier, Assistant Chief of Police, and Mr. J. A. Martin, Regional Ambulance Secretary. The trophy and prizes were presented by Mr. West. The Exeter team will represent the Western Area in the National Competition organised by the St. John Ambulance Association, which is being held at the Central Hall, Westminster, on June 5, 1959.

Increased Costs of U.T.A.—Details of increased costs amounting to over £250,000 were given recently by the Ulster Transport Authority. Increases in the prices of derv and gas oil will cost the Authority about £20,000 a year. In addition, the recent cycle of wage increases will cost over £200,000 a year, to which must be added a further £50,000 a year in respect of the higher national insurance contributions. The Authority has announced that it is trying "to absorb a large proportion of this steeply-rising expenditure by various economies and no adjustment in charges is contemplated at present, but the matter is being kept under review."

Forthcoming Meetings

February 17 (*Tue.*).—Institute of Transport, Humberside Section, at Samman House, Bowlalley Lane, Hull, at 7.30 p.m. Paper on "Electrification of the French Railways," by Mr. C. M. Hannoyer.

February 18 (*Wed.*).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, at 5.30 p.m. Paper on "Some design considerations of main line diesel locomotives," by Mr. T. Schur.

February 18 (*Wed.*).—Institute of Traffic Administration, Bristol & South Western Centre, at the Grand Hotel, Bristol, at 7.30 p.m. Films display by courtesy of the British Transport Commission.

February 18 (*Wed.*).—Railway Discussion Group, at the Peterborough Technical College, Eastfield Road, at 6.45 p.m. Paper on "Railway police work," by Mr. L. James, Chief of Police, Eastern area.

February 19 (*Thu.*).—Diesel Engineers & Users Association, in the Institute of Marine Engineers, the Memorial Building, 76, Mark Lane, E.C.3, at 2.30 p.m. Paper on "The application of diesel engines to automatically controlled power plant," by Mr. K. L. Ives.

February 19 (*Thu.*).—British Railways, Western Region, London Lecture & Debating Society, in the Headquarters Staff Dining Club, Bishop's Bridge Road, Paddington, W.2, at 5.45 p.m. Paper on "Dieselisation—problems, progress and prospects," by Mr. R. A. Smeddle.

February 20 (*Fri.*).—South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, Swansea Section, in the Board Room, of the Docks Manager's Office, Adelaide Street, Swansea, at 6.45 p.m. Joint meeting with the Institute of Transport.

February 20 (*Fri.*).—Institute of Transport, South Wales & Monmouthshire Section, at the Dock Manager's Office, Adelaide Street, Swansea, at 6.15 p.m. Joint meeting with the South Wales & Monmouthshire Railway Lecture & Debating Society.

February 20 (*Fri.*).—Institute of Transport, Tees-side Section at the Cleveland Scientific & Technical Institution, Middlesbrough, at 6.30 p.m. Debate: "That the application of incentive payments to transport workers is beneficial to the industry."

February 23 (*Mon.*).—Institution of Railway Signal Engineers, Bristol Section, at Bristol Temple Meads Station, at 6 p.m. Informal meeting: "Any signalling questions?"

February 23 (*Mon.*).—Railway Correspondence & Travel Society Northampton Branch, at the Liberal Club, Castilian Street, Northampton, at 7.30 p.m. "Snowdrift on Bleath Hill," and other films by the British Railway's Film Unit.

February 25 (*Wed.*).—British Railways, Southern Region, Lecture & Debating Society, at the Chapter House, St. Thomas' Street, London, S.E.1, at 5.45 for 6 p.m. 1959 Continental tour film night.

February 25 (*Wed.*).—Railway Discussion Group, at Peterborough Technical College, Eastfield Road, at 6.45 p.m. Paper on "The press and the public," by Mr. Norman Hamilton, Public Relations Adviser, British Railways, Eastern Region, Liverpool Street.

February 26 (*Thu.*).—Institution of Railway Signal Engineers, Glasgow Branch, at the St. Enoch Hotel, Enoch Square, Glasgow, C.1, at 6 p.m. Paper on "Relay remote control systems," by Mr. G. I. Foster, M.V.—G.R.S. Limited.

February 27 (*Fri.*).—Institution of Locomotive Engineers, at the Dorchester Hotel, Park Lane, London, W.1. Annual luncheon.

February 27 (*Fri.*).—Royal Engineers Army Emergency Reserve (Transportation), at the Cafe Royal, Regent Street, London, W.1. Annual dinner.

Railway Stock Market

More encouraging views in the City on the general election, which it is now being suggested may take place in October rather than May, were responsible for a better tendency in stock markets. Most groups of industrial shares regained part of recent declines, though British Funds turned reactionary, despite the hopes of a coming reduction in bank rate to 3½ per cent. The continued strength of the £, and the further rise in the sterling area's gold and foreign currency reserves, have increased hopes about the trend in export trade. Moreover, the belief continues to be widely held that the Budget will bring important tax cuts with a view to giving a further stimulus to production and increase trade in the home market.

There was again only a limited business among foreign rails, but a little better demand developed for Antofagasta in the hope that the price of copper will rise and help the railway's traffics. Antofagasta ordinary stock at 14¾ compared with 14 a week ago, while the preferences moved up from 26½ to 28. United of Havana second income stock held its recent improvement to 6½, while the consolidated stock continued to be quoted at 1¼. Chilean Northern first debentures held their improvement to 54. Costa Rica ordinary stock was again at 13; the 6½ per cent second debentures, on which it is hoped to make a payment this year on account of arrears, were 87½. Guayaquil & Quito non-assented bonds were quoted at 105 and the assented bonds at 77½. Mexican Central "A" bearer debentures strengthened to 76. San Paulo Railway 3s. units kept at 2s. and Brazil Railway bonds firmed up to 7¼.

Canadian Pacifics at $54 were fractionally lower compared with a week ago; the 4 per cent preference stock was 52¼ and the 4 per cent debentures higher on balance at 66. White Pass shares have eased to $13¾.

Nyasaland Railways ordinary shares held their recent good rise to 15s. 6d.; the 3½ per cent debentures were 62½. West of India Portuguese capital stock showed a number of dealings, and at 104 held its big rise; the 5 per cent debentures were again 90. Barsi Light Railway ordinary stock was quoted at 24. The coming visit of Mr. Macmillan to Moscow led to dealings in bonds of Iron Curtain countries; Wolmar Railway bonds were quoted at 24.

Among shares of locomotive builders and engineers, G. D. Peters remained as firmly held as usual, and were 27s. 6d. Beyer Peacock 5s. shares were 8s. 9d. and Charles Roberts 5s. shares at 9s. 9d. were virtually the same as a week ago, but Birmingham Wagon have receded from 18s. 9d. to 17s. 6d. though North British Locomotive strengthened from 12s. 4½d. to 12s. 7½d. Wagon Repairs 5s. shares were firm at 10s. 6d. and Gloucester Wagon 10s. shares 17s. 9d. Cammell Laird 5s. shares rallied to 9s. 1½d. and Vickers to 34s. 9d. British Timken were firmer at 59s., Ransomes & Marles 5s. shares 17s.6d., T. W. Ward 83s. 6d. and Stone-Platt Industries changed hands around 43s. 1½d. Babcock & Wilcox recovered to 49s. while Coventry Gauge 10s. shares firmed up to 17s. F. Perkins 10s. shares held their rise to 16s. 9d. on the take-over offer from Massey-Ferguson. Westinghouse Brake have recovered from 39s. 9d. to 41s. 3d. and the 10s. shares of the Dowty Group were 43s. 9d. compared with 41s. 3d. a week ago. Pressed Steel 5s. shares changed hands around 24s. 6d.

English Electric have risen from 58s. 3d. to 59s. 9d., Associated Electrical were 55s. 3d. and General Electric gained a few pence at 32s. 9d. while Crompton Parkinson 5s. shares kept at 12s. 1½d. British Oxygen have been active, awaiting the dividend announcement, but at 51s. 3d. failed to hold an earlier rise. A sharp advance to 78s. 9d. was recorded in Tube Investments, while Davy & United Engineering rose further to 90s. 3d. Steel shares did not keep best prices, but were active again and in some cases moved slightly higher as compared with a week ago.

OFFICIAL NOTICES

RAILWAY SURVEYOR-DRAUGHTSMAN required by Railway Siding Constructional Engineers. Applicants must have trained in Railway Draughtsmanship, be able to survey existing trackwork, plot same to working scale and be fully conversant with theodolite and level practice. Men (not over 30 years of age) with knowledge of Railway Standard Specification Layouts preferred, and only those who have specialised in the survey and design of Railway Trackwork in the United Kingdom need apply. Conditions of employment include provision of car, all travelling and general expenses, five-day week on rota system, comprehensive superannuation scheme, etc.—Write in first instance, stating age, experience and salary required, to Sidings Construction Department Manager, Thos. W. Ward Limited, Albion Works, Sheffield, 4.

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